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JOHN JOHNSON KYLE, B.S., M.D.

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PREFACE.

THIS compend is more especially intended for the student and general practitioner of medicine engaging, in a limited way, in the treatment of the ear, nose and throat.

It has been the object of the author to epitomize briefly the best thoughts upon diseases of the ear, nose and throat. The standard text-books, special journals and monographs, particularly of American origin, have been freely consulted, and especial acknowledgment is made to the works of Bosworth, Ingals, Browne, Brown, Burnett, Sajous, D. Braden Kyle, Ballenger, Dench, Bishop, Grunwald, Scheppergrell, St. John Roosa, Shirley, Turner, Grayson and Knight.

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DISEASES OF THE EAR, NOSE AND THROAT.

GENERAL PART.

A GENERAL CONSIDERATION OF THE ANATOMY AND PHYSIOLOGY OF THE EAR, NOSE AND THROAT.

The External Ear.

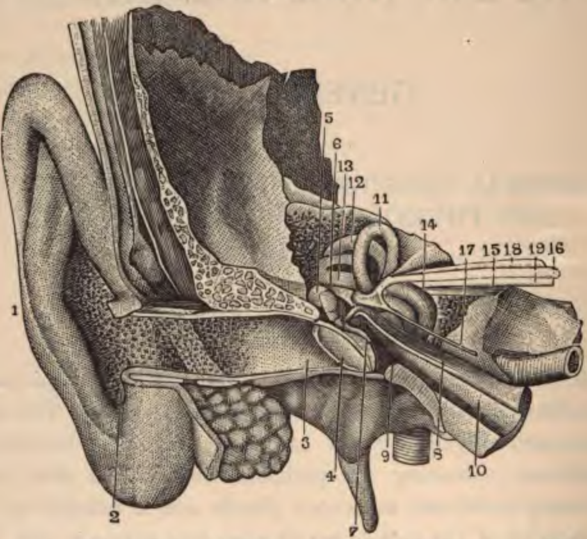
THE external ear is composed of the auricle, or pinna, and the auditory canal, or meatus auditorius externus. The auricle is composed of yellow elastic cartilage, over which lies the perichondrium. Covering the perichondrium is the skin proper, containing sweat and sebaceous glands and a number of hairs. The muscles of the auricle are divided into extrinsic and intrinsic. The extrinsic, or those at the side of the auricle, are the attolens, attrahens and retrahens aurem. The intrinsic, or those within the boundary of the pinna, are the antitragicus, tragicus, helicis major and minor, transversus auriculæ and obliquus auris.

The auditory canal is composed of a cartilaginous and bony portion. The cartilaginous portion is an extension from the cartilage of the pinna. It is about one half inch in length and varies in caliber. The bony portion is about three quarters of an inch in length and terminates at the annulus tympanica.

The skin covering the canal at the cartilaginous portion is an extension from the pinna. The variety of epithelium differs slightly in character as it merges upon the osseous portion.

Along the upper wall we find a great number of ceruminous glands, the function of which is the secretion of a lubricating oil called cerumen. These open into the duct beside the hair-follicles. The meatus is thickly studded with cilia which, by a vibrating motion, expel glandular secretion and minute foreign particles which may find entrance into the canal. As age increases the cilia multiply and often grow to some length. The *integument of the* meatus is thin and is firmly attached to the

FIG. 1.

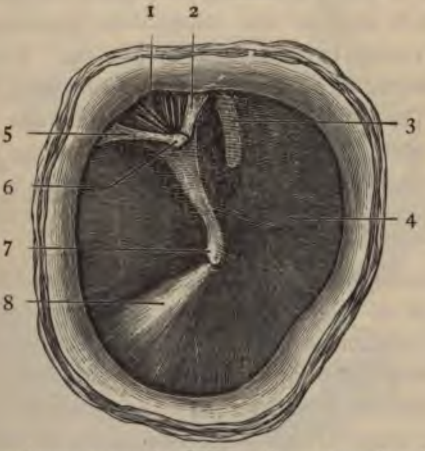


1, Pinna or auricle; 2, concha with orifices of sebaceous and ceruminous glands; 3, osseous portion of external auditory canal; 4, external surface of the membrana tympani; 5, anterior part of the incus; 6, head of the malleus; 7, handle of the malleus lodged between the internal and middle layers of the membrana tympani; 8, tensor tympani with its tendon at a right angle to be attached at the inner margin of the base of the handle of the malleus; 9, cavity of the tympanum; 10, expanded portion of the Eustachian tube; 11, superior semicircular canal; 12, posterior semicircular canal; 13, external semicircular canal; 14, cochlea; 15, the internal auditory canal where the wall has been taken away to show the nerves which it transmits; 16, facial nerve; 17, the great superficial petrosal nerve passing from the geniculate ganglion of the facial to reach its destination; 18, vestibular branch of the auditory nerve; 19, cochlear branch of the auditory nerve. (*Holden.*)

underlying parts. The skin covering the osseous portion of the canal is a continuation of that covering the cartilaginous portion, differing from the latter in that it contains neither glands nor hair. Slender papillæ are found in the vicinity of the tympanic membrane.

The Membrana Tympani or Drum-head.—The membrana tympani, or drum-head, forms a part of the outer wall of the tympanum. It is composed of three layers: the external or cutaneous, the middle or lamina propria and the internal or mucous layer. The drum is circular in form, inclining downward and inward at an angle of fifty degrees and ending peripherally in the annulus fibrosus.

FIG. 2.



1, Shrapnell's membrane; 2, posterior fold of membrana tympani; 3, long process of incus; 4, posterior portion of membrana tympani; 5, anterior fold of membrana tympani; 6, short process of malleus; 7, umbo, or lower extremity of handle of malleus; 8, cone of light. (*Morris.*)

The membrane is 10 mm. in length, 9 mm. in width and 0.1 mm. in thickness (Bruhl). The color of the drum viewed externally through the auditory canal is gray. Three distinct landmarks are visible: (1) The short process of the mall

(2) the manubrium or long process of the malleus and umbo, and (3) the light spot. The drum may be subdivided into four quarters or quadrants: two superior and two inferior quadrants. Within the superior portion and above the short process of the malleus is situated the membrana flaccida or Shrapnell's membrane.

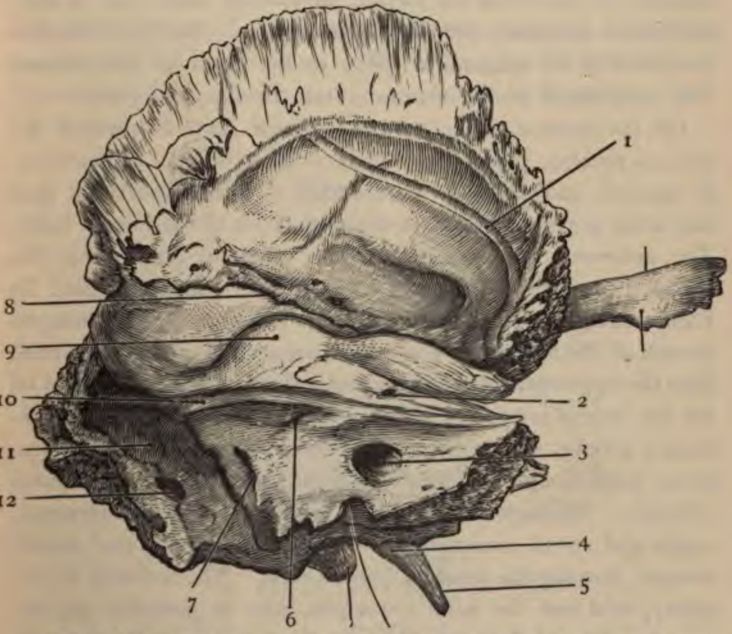
On the inner surface, the short and long processes of the malleus are found fixed to the membrana propria. The long process may be seen extending backward and downward, ending near the center of the drum, from which is given off a triangular light spot, or cone of light, extending downward and forward. The short process is more or less conspicuous, depending upon any pathological change in the drum or middle ear. The drum membrane, on account of its attachment to the malleus, is not evenly stretched. The function of the drum membrane is the transmission of sound by vibrations. These vibrations number from 16 to 40,000 per second. The drum membrane is not essential to hearing.

The Temporal Bone.

The temporal bone is a large irregularly shaped bone, situated on either side of the skull, articulating in front with the great wing of the sphenoid and frontal bones, above with the parietal and behind with the occipital bone. The apex of the pyramidal or petrous process articulates with the sphenoid and occipital bones. The temporal bone is anatomically divided into three portions: (1) squamous, (2) petrous, and (3) tympanic. The squamous portion is a thin plate of bone. When viewed laterally it is circular in outline. The zygomatic process of the temporal bone has two origins, one anterior to the meatus auditorium and the other superior to the meatus. The supra-mastoid ridge is a prolongation of this root, and, as a rule, is situated a little below the floor of the middle fossa of the cranium. Below the supra-mastoid ridge, and slightly above and back of the meatus, is the spine of Henle. Upon examination of the temporal bone, *this important* landmark is as a rule present. The experience of a number of writers would lead us to depend upon the supramastoid fossa as a guide to opening the mastoid rather than a literal dependence upon the small spine of Henle.

The junction of the squamous and petrous portion is called the squamo-mastoid suture. The mastoid process is situated posteriorly and inferiorly to the external auditory meatus. This is

FIG. 3.



1, For middle meningeal artery; 2, hiatus Fallopii; 3, meatus auditorius internus; 4, aqueductus cochleæ; 5, styloid process; 6, depression for dura mater; 7, aqueductus vestibuli; 8, petro-squamous fissure; 9, eminence for superior semicircular canal; 10, superior petrosal sinus; 11, lateral sulcus; 12, mastoid foramen. (*Morris.*)

of great importance to the student, for herein is located the antrum and mastoid cells. The structure of the ma [illegible] in childhood and old age. The external wall cover [illegible] antrum may, as in infants, be thin like tissue p [illegible] one adult subject it may be of great density, in another it is of hard thin bone. It will be observed that the pneumatic condition, which is usually found in the mastoid process of the adult, has a great tendency to disappear in the aged, which accounts for a loss of bone conduction. The depth of the antrum varies. Broca, who is freely quoted in the preparation of the anatomy of the ear, makes mention of the antrum, in one case being situated 11 mm. from the surface, in another case 15 to 16 mm. and in an extremely old case 25 to 29 mm. No fixed rule can be found as an anatomical guide to the depth of the antrum. The usual depth of the antrum is from 12 mm. to 15 mm.

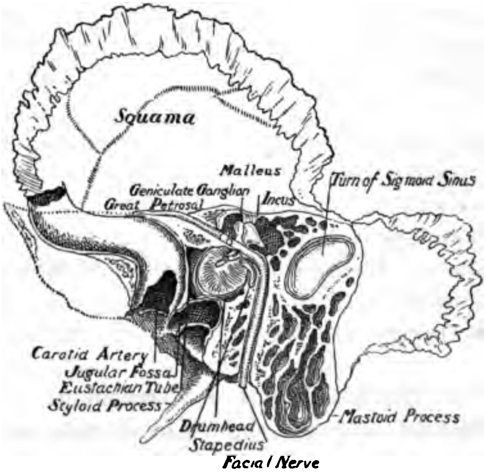
On the internal surface of the temporal bone is situated the petrous portion, presenting a three-sided pyramidal appearance. It supports and protects more organs of vital importance than any other portion of bone in the framework of the human body. The anterior border assisted by the sphenoid bone forms the foramen lacerum medius, the lower part of which is closed by fibro-cartilage, which is pierced by the vidian nerve, a meningeal branch of the ascending pharyngeal artery and an emissary vein. Into the upper part of the outer and anterior walls open the canal for the carotid artery and vidian nerve. The upper border presents a groove, which lodges the inferior petrosal sinus, the posterior border lodges the inferior petrosal sinus and jugular foramen (Bruhl). Through this foramen passes the glosso-pharyngeal, vagus and spinal accessory nerves, also the inferior and lateral sinuses, forming the internal jugular vein. The auditory nerve, artery, vein and the facial nerve pass into the posterior and superior surface of the bone, through the internal auditory canal.

Near the middle of the pyramid on its superior border, anterior to the groove of the superior petrosal sinus, a bony ridge will be noted, which defines the position of the superior semicircular canal. External to the ridge is a depression beneath which is located the antrum, and roof of the tympanic cavity. Through this thin plate of bone pus frequently passes into the *middle fossa,* as a result of necrosis of the bone. The posterior wall which separates the jugular fossa from the mastoid cells may also be thinned by suppuration, allowing the entrance of pus into the fossa, or involving the outer covering of the cerebrum, at its attachment to the posterior wall of the pyramid internal to the ridge of the jugular fossa. An abscess in this region can be opened and drained without injury to the lateral sinuses.

Facial Nerve.

At the bottom of the meatus auditorius internus, the facial nerve enters the aqueductus Fallopii, curving downward and outward, making its exit at the stylo-mastoid foramen. Two important branches of the facial nerve are given off in its passage through the bony structure, the stapedius and the chorda tympani. The function of the stapedius is to supply motor fibers to the stapedius muscle. The function of the muscles is to lift the base of the stapedius out of the oval window.

FIG. 4.



SAGITTAL SECTION OF TEMPORAL BONE, SHOWING COURSE OF THE FACIAL NERVE. (*After Randall.*)

paralysis of the nerve is usually followed by a decrease of hearing on that side from the stapedius being forced into the oval window by the tensor tympani. The chorda tympani is given off from the nerve as it curves downward into the stylo-mastoid foramen, passes upward and forward across the tympanum, joining the lingual branch of the fifth nerve for a short distance. It then subdivides, one branch going to the tongue and the other to the submaxillary ganglion. The sensory fibers of the chorda tympani are vaso-dilators. The motor fibers antagonize the stapedius and tend to hold the foot plate in the oval window.

The relative position of the nerve in relation to the tympanic cavity is well shown in the illustration. The position of the facial nerve, after its entrance into the internal auditory canal, becomes of special interest on account of its frequent injury in tympanic and mastoid operations. The course of the nerve is across the inner wall of the tympanic cavity, and is observed lying in a bony eminence above the stapes, anterior to the horizontal semicircular canal, on a plane drawn through the neck of the malleus and the short process of the incus. A very thin partition, or wall, separates the nerve from the tympanic cavity. The wall is so thin that a sharp instrument will readily wound the facial nerve. In operating for abscess of the mastoid and the removal of necrotic bone in the tympanic cavity, by carefully avoiding this region, no danger of wounding the facial nerve is incurred.

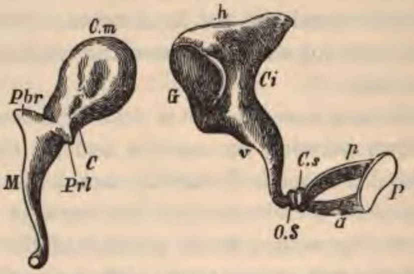
The Middle Ear or Tympanum.

The middle ear, or tympanum, is a small irregular cavity, oblong in character, situated in the petrous portion of the temporal bone, between the external meatus and internal ear. The mucous membrane of the middle ear is a simple pseudo-stratified ciliated epithelium, closely connected with the periosteum. Within this chamber are found the malleus, the incus and the stapes, covered with the same variety of epithelium, with the exception of the cilia, which are lacking to a great extent. The *superior portion* of the tympanum, beginning with a line drawn through the short process of the malleus, is called the attic, and has free communication with the mastoid antrum. The middle ear is of special importance on account of its peculiar structure, and its relation to the mastoid cells. The attic lodges the greater portion of the ossicles. It is bounded externally by Shrapnell's membrane and by a bony wall, and superiorly by the roof of the tympanum, which separates it from the middle cranial fossa. The posterior wall is important, for here is found the aditus ad antrum. The internal wall is in close apposition to the semicircular canal and the facial nerve. On the superior portion of the anterior wall is located the tympanic opening of the Eustachian tube.

"The ossicles are covered with a fold of mucous membrane which dips down between the ossicles and the chorda tympani nerve." Prussak's space is formed by such a fold being located between Shrapnell's membrane and the neck of the malleus, above the lateral ligament. Small pouches of this character situated in the attic often communicate with each other. We may have suppuration from some portion of the attic emptying through the superior border of Shrapnell's membrane or pars ossa, without involvement of the tympanic cavity. Bruhl makes mention of the likelihood of pus draining from the upper incudo-malleolar space into the antrum, or into Prussak's space, through a perforation in Shrapnell's membrane, or into the tympanic cavity, followed by perforation lower down. It is for this reason that many cases of chronic suppuration with perforation in the lower quadrant of the tympanic membrane are slow to respond to therapy.

The Ossicles. — The ossicles are three in number, articulating in such a manner as to connect completely the membrana tympani with the fenestra ovalis. The stapes is firmly supported in the fenestra ovalis by a strong ligamentous structure. The incus is situated between the malleus and stapes. It possesses two processes. The short process is attached lightly to the posterior tympanic wall. The long process continues backward, parallel to the malleus and articulates with the stapes by the intervention of the os orbiculare. The position of the incus and its attachments are of special interest, on account of the very frequent indication for the removal of this bone. The malleus is the larger of the ossicles. It connects the incus and membrana tympani, completing the ossicular chain. It possesses a head, neck and shaft, and two processes, long and short.

FIG. 5.



Cm, head of the malleus; *C*, neck; *Pbr*, short process; *Pbl*, long process; *M*, manubrium or handle; *Ci*, body of the incus; *G*, articular surface; *h*, short and *v* long processes; *O, S*, so-called lenticular ossicle; *Cs*, head of the stapes; *a*, anterior; *p*, posterior limb or crus; *P*, plate of the stapes. (*Holden.*)

The articulating surfaces of the ossicles are covered with hyaline cartilage. The function of the ossicular chain is the transmission of sound waves. "This is effected by oscillation of the bone or molecular vibrations of their particles, or probably both" (Kirke). Foster takes exception to the theory of molecular vibration, believing only in the oscillation of the small bones.

Sound waves may be conducted through the bone proper of the temporal bone to the perilymph, and certain vibrations may also pass up the Eustachian tube to the ossicular chain.

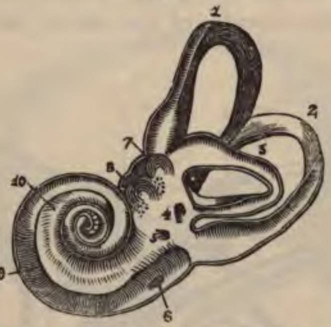
The Internal Ear.

The internal ear consists of an osseous and membranous portion respectively named the osseous and membranous labyrinths.

The osseous portion relatively forms the inner wall of the tympanic cavity.

The membranous labyrinth is the same as the osseous in general outline. The structures are separated by a lymph space, filled with perilymph. As viewed in the figure (Fig. 6), the osseous portion possesses a vestibule, semicircular canals (three in number), distinct ampulla, fenestra rotunda, fenestra ovalis and bony cochlea. The osseous labyrinth is lined with a thin layer of periosteum covered with endothelial cells. In a normal condition, the inner surface is smooth and compact. From the epithelial cells is secreted the perilymph. The membranous labyrinth (Fig. 7) is essentially the organ of perception, for herein terminates the auditory nerve, in a manner hereafter to be explained. The membranous labyrinth differs in form from the osseous in this respect: in place of a vestibule two sacs are present, the utriculus and the sacculus, connected by the utriculo-saccular duct. The saccula communicates with the cochlea by means of the canalis reuniens. The utriculus is continuous with the semicircular canal. Within the membranous labyrinth is found the

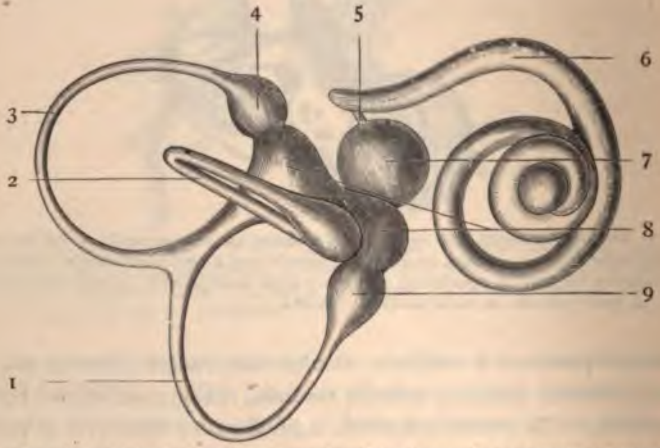
FIG. 6.



1, The superior semicircular canal; 2, the posterior semicircular canal; 3, the external semicircular canal; 4, common opening of the superior and posterior semicircular canals; 5, aqueductus vestibuli; 6, aqueductus cochleæ; 7, fovea hemi-elliptica; 8, fovea hemi-spherica; 9, scala tympani; 10, scala vestibuli. (*Holden.*)

endolymph whose function is the transmission of vibration previously received from the endolymph to the auditory epithelium of the cristæ and maculæ. The auditory nerve enters through the foramen auditorium internæ, and there it subdivides. One branch passes to the ampulla of the semicircular canal, and the utriculus, the other branch to the sacculus and the cochlea. It is supposed that the portion of the auditory nerve going to the semicircular canals, maculæ of the utricle and of the sacculæ, plays a very important part in the control of the equilibrium of the body. "The portion of the nerve going to the cochlea carries auditory impulses only" (Foster).

FIG. 7.



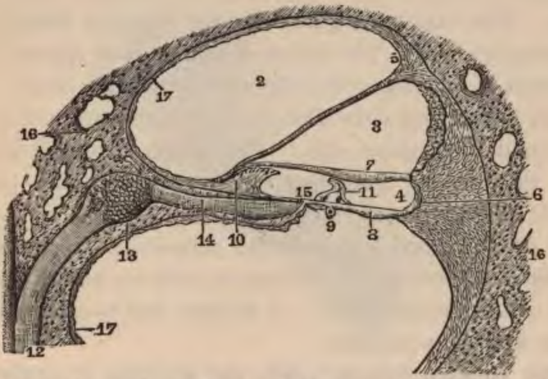
1, Superior semicircular canal; 2, external semicircular canal; 3, posterior semicircular canal; 4, ampulla; 5, canalis reuniens; 6, scala media of cochlea; 7, saccule; 8, ampulla and utricle; 9, ampulla. (*Morris*.)

Viewed transversely, the cochlea presents three distinct subdivisions: (1) scala vestibuli, (2) scala tympani, and (3) canalis cochlearis. The cochlear branch of the nerve passing upward through the lamina spiralis ossa distributes terminal *fibers to the organ* of Corti (Fig. 8).

Vibrations of the endolymph influence the hair cells of the organ of Corti in such a way as to stimulate certain specific impulses which are often very complex. These impulses range from 16 to 40,000 vibrations per second.

Otoliths are small crystals of calcium carbonate formed on the surface of the neuro-epithelial cells supporting the hair cells.

FIG. 8.



1, Scala tympani; 2, scala vestibuli; 3, scala media; 4, canal of Corti; 5, ligamentum spiralis; 6, external spiral groove: 7, membrane of Corti; 8, membrana basilaris; 9, spiral vessel subjacent to the smooth zone of this membrane; 10, sulcus spiralis; 11, rods of Corti; 12, a branch of the cochlear nerve; 13, spiral ganglion; 14, the same nerve which after having traversed the spiral ganglion, makes its way between the two laminæ of the osseous lamina spiralis; 15, one of the foramina by which this branch penetrates the canal of Corti to terminate in the organ which it comprises; 16, bone forming the margin of the lamina; 17, periosteum of inner wall of the cochlea. (*Holden.*)

They are presumed to possess a controlling influence over the vibrations of the hair cells.

The Blood Supply.

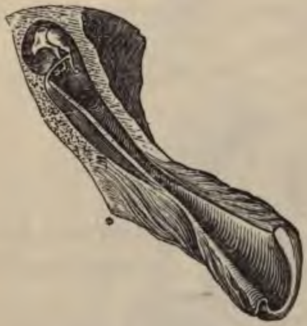
The blood supply of the conducting apparatus is derived from the external and internal carotid. The auricle is supplied by branches from the occipital, the posterior auricular and a few small twigs from the temporal arteries. The internal maxillary artery gives off the tympanic and middle meningeal, which sup-

[illegible] capillaries.

[illegible] in length, ex-
[illegible] -ward through
[illegible] -pharynx.
[illegible] cartilagi-
[illegible] the car-
[illegible] -tion is
[illegible]

The mucous membrane of the osseous portion is of the pseudo-stratified ciliated variety containing no glands. The mucous membrane of the cartilaginous portion is likewise of the pseudo-stratified variety, much thicker than that found in the osseous portion and contains goblet cells and lymphoid tissue. At the pharyngeal orifice, the blood supply is greater and the mucous glands are numerous.

FIG. 9.

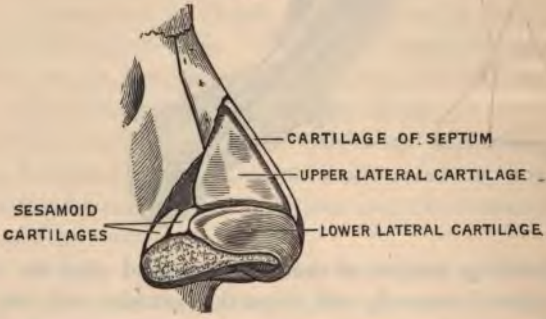


The cartilage proper of the tube is shaped after the manner of the letter S reversed, and forms the posterior wall, the upper border bending downward and forward. Fibrous and muscular tissue fill up the space completing the canal. The mucous membrane with the exception of the upper half of the tube is in contact, forming irregular valves. The function of the Eustachian tube is to conduct air to the tympanic cavity and to act as a drainage canal for the middle ear.

The Nose and Nasal Fossa.

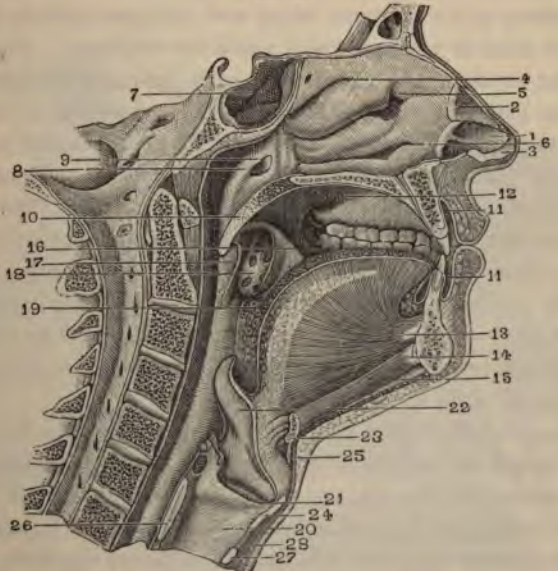
The nose is the beginning of the respiratory tract, and is situated in the median line of the middle third of the face. Two subdivisions are at once apparent, namely, anterior nares and nasal fossa. It possesses two parallel chambers, opening anteriorly to the nostrils and communicating posteriorly with the naso-pharynx. The lateral surfaces of the external nose are triangular, although it will be observed that racial characteristics play a conspicuous part in moulding the shape of the nose. At the root of the nose, or at the joint of articulation with the frontal bones, are the two nasal bones, and the two nasal processes of the superior maxillary bones. Below and outward, on the lateral surfaces, are situated the upper and lower lateral cartilages. Posterior to the lower lateral cartilages are the sesamoid cartilages, below which are situated the cell tissues, all covered with normal skin. The nerve supply is from the nasal, infra-trochlear and infra-orbital nerves, with branches from the facial nerve. Sebaceous glands are freely distributed over the surface. The base of the nose presents two apertures, separated by the septum, extending antero-posteriorly. The septum is formed by the perpendicular plate of the ethmoid bone, the vomer and an anterior cartilage, hyaline in character. The attic, or roof, is formed by the horizontal plate of the ethmoid, nasal bones and nasal spine of the frontal bone. The posterior portion of the roof is formed by the anterior wall of the sphenoid cells. The outer wall is formed by the frontal, ethmoid, lacrymal and sphenoid bones. Three distinct scroll-shaped irregularities are observed on the outer walls of the nasal fossa, the *superior, inferior,* middle turbinated bones (*conchæ nasi*).

FIG. 10.



The superior turbinated bone is situated far back in the nasal attic chamber. The middle turbinate is somewhat lower down, extending further forward, while the lower turbinated bone extends practically three fourths of the length of the outer wall of the nasal fossa. The first two are extensions of the ethmoid bone. The last, or lower turbinated bone, is distinct, articulating with the superior maxillary, varying in length from 20 to 50

FIG. II.



1, Left nares; 2, lateral cartilage of the nose; 3, portion of the internal cartilage forming the skeleton of the lower part; 4, superior meatus; 5, middle meatus; 6, inferior meatus; 7, sphenoidal sinuses; 8, external boundary of the posterior nares; 9, internal elliptical opening of the Eustachian tube; 10, soft palate; 11, vestibule of the mouth; 12, vault of palate; 13, genio-glossus muscle; 14, genio-hyoid muscle; 15, cut margin of the mylohyoid muscle; 16; anterior pillar of the palate (anterior half-arch), presenting a triangular figure with the base inferiorly, covering partly the tonsil; 17, posterior pillar (posterior half-arch) of the palate, 18, tonsil; 19, follicular (mucous) glands at the base of the tongue; 20, cavity of the larynx; 21, ventricle of the larynx; 22, epiglottis; 23, cut os hyoides; 24, cut thyroid cartilage; 27, section of the anterior portion of the same cartilage; 28, crico-thyroid membrane. (*Holden.*)

mm. The recesses below the turbinated bones are correspondingly called superior, middle and inferior meatuses. The nasal cavity is divided regionally into the vestibular respiratory with accessory cavities, and the olfactory region.

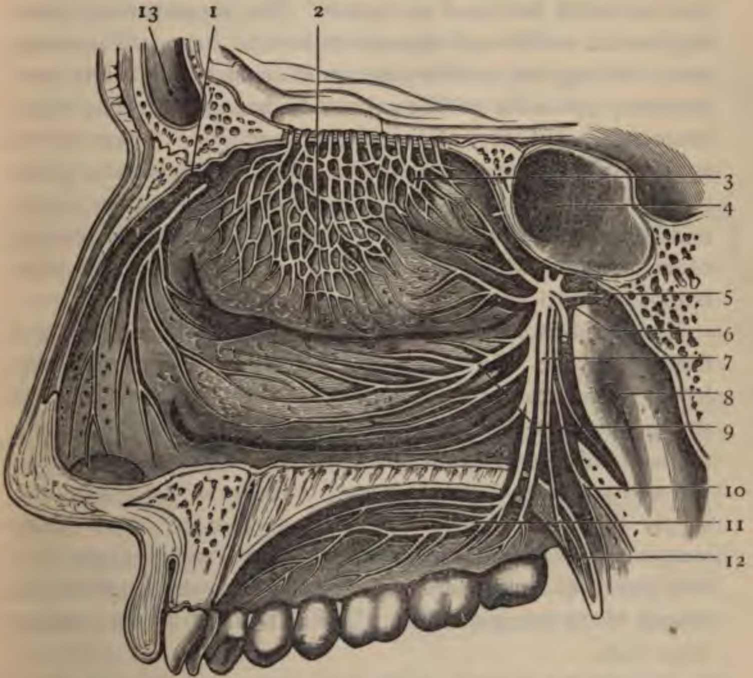
Beginning with the vestibule, which is that part of the nose opening anteriorly, we find it covered with stratified pavement epithelium which contains sweat and sebaceous glands and numerous hairs or vibrissæ which guard the entrance. Slightly below the entrance the glands and hairs gradually disappear, and mucous glands appear. The respiratory region begins, relatively speaking, at the anterior end of the lower turbinated bone, extending upward as far as the edge of the superior turbinate. The epithelium changes at the inner margin of the vestibule to the pseudo-stratified ciliated variety containing goblet cells. The tissue covering the surface of the lower turbinated bone is irregular in outline, resembling erectile tissue. Mucous, serous and lymphatic glands are present in great numbers. The mucosa of the middle turbinated bone is not so dense, containing a lessened amount of blood supply and cavernous tissue.

The olfactory region is that portion of the nasal fossa above the dependent portion of the superior turbinated bones. The epithelium covering this region, both septal and turbinal, is made up of a single layer of cylindrical cells whose nuclei lie at different levels (Szymonowitz and McCallum) and differs distinctly in color from that observed in the respiratory region, being of a yellowish tinge rather than a pale pink. The mucosa is thin and, to a certain extent, non-vascular.

The Olfactory Nerves. — The olfactory nerves enter the nasal fossa by twelve or more branches from the olfactory bulb and pass through the cribriform plate of the ethmoid bone, dividing into three portions, inner, middle and outer. The inner portion is distributed to the septum at its upper third, the middle portion to the roof of the nose, and the outer to the surface of the superior and middle turbinated bone and the anterior surface of *the ethmoid bone* in front of them (Gray).

Within the epithelium of this region are the olfactory and sustentacular cells which receive the sensory impulses known as smell. The glands of Bowman supply the mucosa with a serous secretion which keeps the surface moist, and in a condition to receive atmospheric impressions. It will be noticed that a drying up of the secretions from atrophy of the small gland or obstruction of the lumen of the ducts from active or passive [illegible] a potent cause of anosmia.

FIG. 12.



1, Nasal nerve; 2, olfactory nerve; 3, olfactory nerve to superior turbinate bone; 4, sphenoidal sinus; 5, Vidian nerve; 6, Meckel's ganglion; 7, descending palatine; 8, orifice of Eustachian tube; 9, nasal branches; 10, posterior palatine; 11, anterior palatine; 12, middle palatine; 13, frontal sinus. (*Morris.*)

Nerves of Sensation. — The nasal nerve, which is a branch of the ophthalmic division of the fifth nerve, passes into the nasal fossa through a slit at the side of the crista galli, thence downward and forward, supplying the sensation to the tip of the nose, and to the outer surface of the anterior nares and septum. Branches from the anterior palatine are distributed to the inferior turbinated bone and its meatus. The superior nasal nerve supplies the middle and superior turbinated bone, the posterior part of the septum, and the posterior ethmoidal cells. The naso-palatine supplies the middle portion of the septum. The vidian nerve unites with those from Meckel's ganglion. These nerves are part of the sympathetic system. The spheno-palatine of the sympathetic (Meckel's ganglion) sends branches to the upper, middle and lower turbinated bones and to the posterior portion of the septum. The fibers control the vascular and secretory system of the nasal fossa.

The Blood Supply. — The blood supply of the nasal fossa is from the spheno-palatine artery, a branch of the internal maxillary. Two branches are given off from the spheno-palatine, the internal going to the septum and the external to the lateral walls, ethmoid cells, frontal sinus and antrum of Highmore. The anterior and posterior ethmoid arteries, branches of the ophthalmic, supply short branches to the attic, ethmoid cells and frontal sinuses. The superior coronary sends short branches to the anterior portion of the septum. The descending palatine, which is a branch of the internal maxillary, sends branches to the posterior outer wall.

The Lymphatics.

The lymphatics are very numerous. They cover the surface and enter into the glands on the lateral wall of the pharynx.

Functions of the Nasal and Accessory Cavities.

The functions of the nasal and accessory cavities are, as *described by Burnett,* (1) respiration, (2) olfaction, (3) the office of resonator to the voice, (4) the office of regulating the atmospheric pressure in the middle ear.

The air, as it passes through the nasal cavity, is warmed, moistened and purified, and is thus prepared for reception into the lungs. Moisture is furnished from the mucous surface.
contact with warm walls
Heat is generated by the muscular activity of the body. The air is purified by the long hairs of the vestibule, which act as a sieve. Abnormal atmospheric pressure upon the mucosa of the nose and naso-pharynx will disturb its molecular equilibrium and quickly affect nutrition of the Eustachian tube and pneumatic function of the middle ear. The reflex action of sneezing, and a slight bactericidal property of the ~~nasal secretion~~, all aid in preparing the air for passage into the lungs. The sense of smell, in enabling us to avoid noxious air, also aids greatly in respiration. Since inspired air demands such radical alteration before entering the lungs it is at once apparent why mouth-breathing is so detrimental to health. We can also conclude how quickly an alteration in the size of one or the other of the nasal cavities sufficient to prevent the air from reaching the greatest possible surface of the cavity, may also contribute to a disease of the upper and lower air passages. The respiratory region of the nose is not a fixed one and depends upon the shape and size of the nostrils.

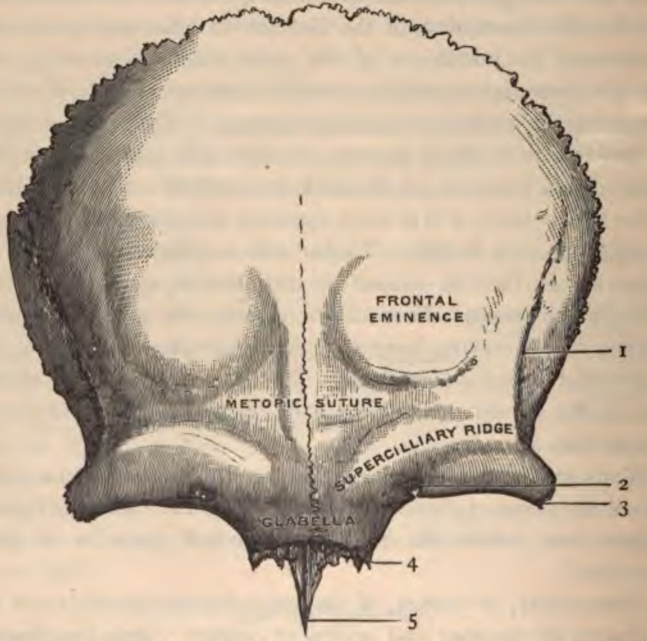
Many experimenters believe that the respiratory current passes above the lower turbinated bone, even to the olfactory region, rather than below the middle turbinated bone as so often described.

The quality, or timbre, of the voice depends greatly upon the character of the nose and accessory cavities. Any interference with the sound waves in their passage through the nose destroys the natural resonance of the voice. The size of the accessory cavities to a great measure affects the quality of the voice. The olfactory sensibility is necessarily dependent upon the normal condition of the mucosa for atmospheric waves to produce their impression upon the hair cells of olfaction.

The Accessory Sinuses.

The accessory sinuses of the nose are those cavities or pneumatic air spaces which are in direct relation by one or more openings with the nasal cavity. They consist of two frontal, ① two ④ ethmoidal, and two ③ sphenoidal sinuses, with two antra of Highmore (sinus ② maxillaris). The mucous membrane covering the antrum of Highmore is of a pseudo-stratified ciliated variety,

FIG. 13.



1, Temporal ridge; 2, supraorbital notch; 3, external angular process; 4, internal angular process; 5, internal angular process; 6, nasal spine.

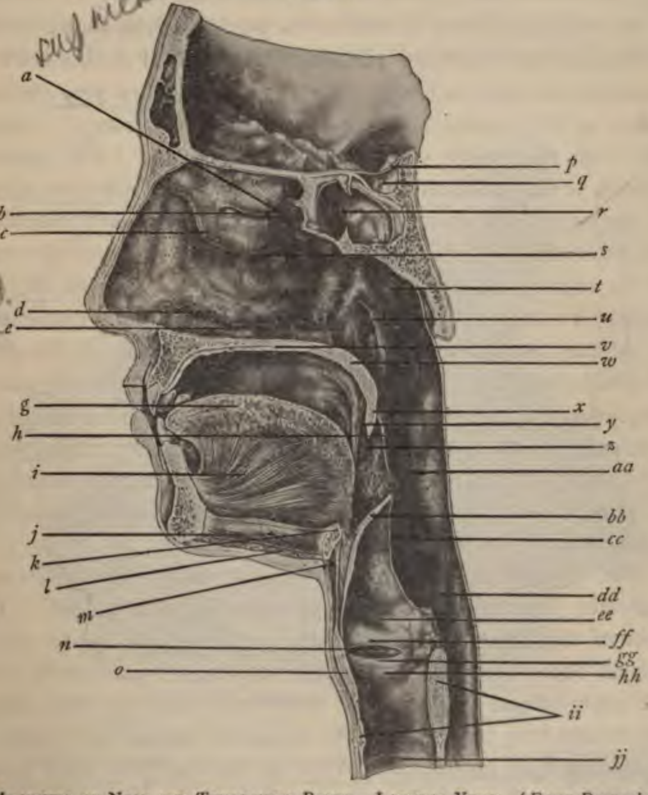
and pale pink in color. That of the frontal, sphenoidal and ethmoidal is of the pseudo-stratified ciliated variety. The mucous membrane lining the cells is in direct apposition to the bone, *varying in thickness* in the different sinuses. The mucous glands *of the epithelium* are of the simple tubular variety.

The function of the accessory sinuses is principally to lighten the weight of the skull and to contribute an uncertain influ-

FIG. 14.

sup meat

Sup meat.



MEATUSES OF NOSE AND TURBINATED BONES—LATERAL VIEW. (*From Deaver's Surgical Anatomy.*)

a, Superior meatus; *b*, superior turbinal; *c*, middle turbinal; *d*, inferior turbinal; *e*, inferior meatus; *f*, vestibule; *g*, tongue; *h*, posterior pillar of fauces; *i*, genio-hyo-glossus m.; *j*, genio-hyoid m.; *k*, hyoid bone; *l*, mylo-hyoid m. (cut edge); *m*, thyro-hyoid membrane (cut edge); *n*, ventricle of larynx; *o*, thyroid cartilage; *p*, diaphragma sellæ; *q*, cavum sellæ; *r*, sphenoidal cell; *s*, middle meatus; *t*, naso-pharynx; *u*, orifice of Eustachian
tube; *v*, hard palate; *w*, soft palate; *x*, uvula; *y*, anterior pillar of fauces; *z*,
cess of fauces; *aa*, oro-pharynx; *bb*, epiglottis (cut edge); cc, aryteno-epiglo
dd, laryngo-pharynx; *ee*, suprarimal portion of larynx; *ff*, false vocal cord;
cord; *hh*, *infrarimal portion of* larynx; *ii*, cricoid cartilage (cut); *jj*, ring of

ence to the resonance of the voice. As the mucous surface is supplied with glands and a plexus of blood-vessels, a certain amount of mucus is furnished to the surface of the nasal cavity, and contributes moisture to the inspired atmosphere.

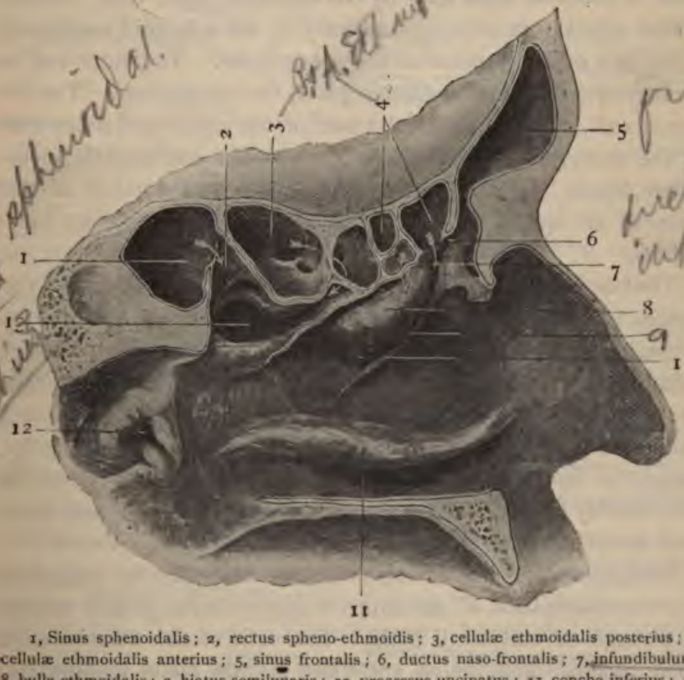
On making a lateral section of the adult skull, as shown in the accompanying illustration (Fig. 15), the frontal sinuses are first presented for observation. At the end of the first year the two halves of the frontal bone unite at the frontal suture. About this time the frontal sinuses begin to develop. The general opinion is that these sinuses are not formed until after the eighth or tenth year. Two surfaces of the frontal bone are presented, the outer and the inner. On the outer surface above the roof of the root of the nose, in the median line, is situated the glabella. To the right and left of and below the frontal eminences, are situated the superciliary ridges. Their convexity, at the junction with the glabella, is often very great. This convexity gradually fades away as they arch upward. The comparative size of the convexity of the glabella and of the superciliary ridges is an indication of the size of the frontal cells, which are situated immediately beneath them, and are bounded posteriorly by the inner table.

The ophryon is the convexity situated above the glabella and indicates the median vertical extension of the sinuses. The floor of the frontal cells is formed by the orbital plate of the frontal bone, curving upward and outward in conformity with the supra-orbital ridge. The inner table and the floor of the sinuses are very thin, and in the young are susceptible to marked distention from exudation. When in this condition they crowd outward into the orbital cavity or displace the floor of the ethmoidal cells downward into the nasal cavity.

The Ostium Frontale or the Fronto-Nasal Opening.

The opening is funnel-shaped, and is situated at the inner and most dependent portion of the floor. The wall of the thin septum forms a part of the canal. The natural course of the canal is slightly backward and downward. The nasal opening is situated beneath the middle turbinated bone in the anterior middle meatus. The infundibulum, as shown in the figure, and as described by Gray, is a long flexuous canal, situated anteriorly to the bulla ethmoidalis, and on the outer wall of the middle meatus. It is often found immediately connecting and forming

FIG. 15.



1, Sinus sphenoidalis; 2, rectus spheno-ethmoidis; 3, cellulæ ethmoidalis posterius; 4, cellulæ ethmoidalis anterius; 5, sinus frontalis; 6, ductus naso-frontalis; 7, infundibulum; 8, bulla ethmoidalis; 9, hiatus semilunaris; 10, processus uncinatus; 11, concha inferius; 12, tuba Eustachius; 13, meatus superius. (*Turner.*)

a part of the frontal nasal duct. Its mission is to act as a drainage canal for the anterior ethmoidal cells.

The Ethmoidal Cells. — The ethmoidal cells (cellulæ ethmoidalis) by some authorities are divided into three sets, anterior, middle and *posterior*. By others they are divided into two set anterior and posterior. Turner defines their position more clearly when he says: "All the cells which communicate with the middle meatus of the nose, below the line of the origin of the middle turbinated bones, are anterior ethmoidal cells, and those which communicate with the superior meatus above the middle turbinated bones are posterior ethmoidal cells."

The lateral mass of the ethmoid bone, containing the ethmoid cells, is bounded anteriorly by the lacrymal bone, nasal process of the superior maxillary, posteriorly by the sphenoid, turbinated bones and orbital process of the palate bone. The outer wall is formed by a thin perpendicular plate, the os planum. The internal wall, which constitutes a part of the upper and outer wall of the nasal fossa, is formed by the superior and middle turbinated bones. The relative position, size and number of the anterior air spaces will vary from one to five in different individuals.

The posterior ethmoidal cells, composed of one, two or three spaces, varying in size and position, open into the superior meatus through one or both ostia. Mucus and pus from the posterior ethmoidal cells may, according to the position of the head, drain backward over the posterior surface of the middle turbinated bone into the naso-pharynx or flow forward over the anterior margin of the middle turbinated bone. The anterior ethmoidal cells usually consist of one or two chambers, although cases have been noted in which seven or eight have been found (Turner).

As a general rule, the anterior cells outnumber the posterior. The communication of the anterior cells with the middle meatus is through several small ostia. The ostia of the anterior cells open into the infundibulum and drain into the hiatus semilunaris, which is directly beneath the bulla ethmoidalis and above the uncinate process of the ethmoid bone. The ostia of the posterior cells open directly into the superior meatus. In a normal skull, the posterior ethmoidal cells extend downward from the attachment of the middle turbinated bone to the thin wall separating *the sphenoid cells.* As a rule there is no communication between the ethmoidal antrum and the sphenoidal cells. The general shape of the posterior cells may vary in individuals, sometimes extending into the sphenoid bone, forming a spheno-ethmoidal cell. The posterior cells, as a rule, open from one ostium situated in the superior meatus. The mucous membrane covering the ethmoidal cells is of a stratified ciliated variety, containing mucous glands.

The bulla ethmoidalis is situated in the meatus semilunaris and is a part of the anterior ethmoidal cells. It is a small, round bony prominence, with the convexity downward and forward, within which is contained one or more cells which open on its superior surface into the middle meatus.

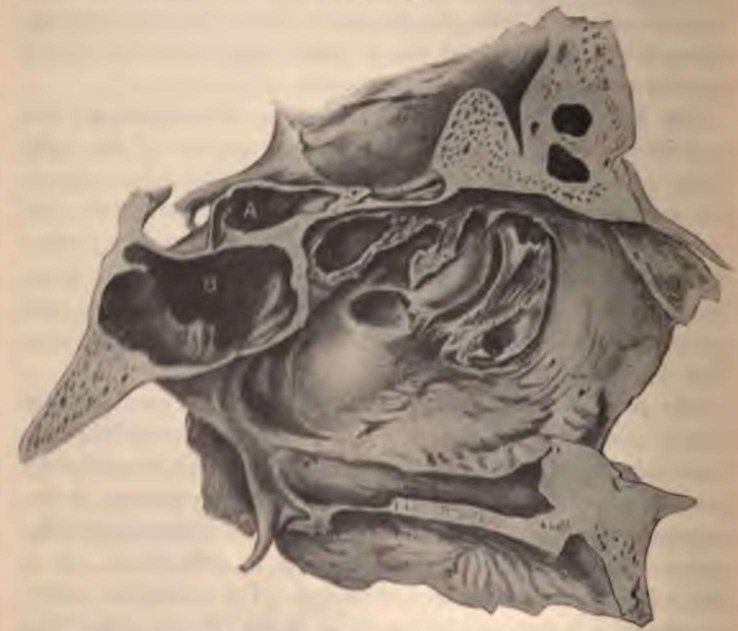
The Sphenoidal Sinuses. — The sphenoidal sinuses are two in number and are situated in the anterior portion of the body of the sphenoid bone, below and anterior to the optic commissure and posterior to the ethmoidal cells. Separating the two cavities is a vertical bony septum. The sinuses are fully formed about the tenth year of life. The cavity is irregular in form. Its transverse diameter corresponds to that observed in the posterior wall of the ethmoidal cells. The height of the cells varies from 6 to 12 mm.

The plate of bone separating the cells from the cranial cavity is very thin, often less than 1 mm. It will be observed that the more dependent portion of the floor of the cell is located at its junction with the ethmoid bone. The ostium is situated in the anterior wall above the floor, draining into the spheno-ethmoidal recess. The thickness of the wall varies in individuals. As a rule it is very thin and easily perforated. The epithelium covering the sinus is the same as that found in the ethmoid cells. The position of the sphenoidal cells is of especial interest from a surgical standpoint on account of the important organs in close proximity.

Above the cells are found the optic commissure and pituitary body. The internal carotid, cavernous sinus, superior maxillary nerve, and ophthalmic vein all pass near the lateral wall.

Accessory Air Cells of the Sphenoid Bone.—The accessory air cells of the sphenoid bone have been especially described by Hajek and Zuckerkandel. H. Beman Douglass and others in this country have called special attention to the surgical importance of the small accessory sinuses situated in the wing of the sphenoid bone, distinct from the sphenoidal cell proper, and emptying into the posterior ethmoidal cell or recessus spheno-ethmoidalis.

FIG. 16.



SINUS OF SMALL WING LYING HIGHER THAN POSTERIOR ETHMOID CELL.
A, Accessory sphenoid sinus; *B*, main sphenoid sinus. (*Douglass.*)

The great importance of the knowledge of such accessory sinuses is apparent in those cases of suppurative inflammation of the sphenoidal and ethmoidal sinuses, which we are reasonably certain to have [illegible] from which a purulent discharge still issues.

That the cells are easily located, or may be opened without danger, is to state a bad proposition, and the young operator would be wiser under such circumstances to trust the operative procedure to men skilled in the surgical technique of this region.

The Pharynx.

The pharynx is that portion of the respiratory tract posterior to the nasal fossa and buccal cavity, anterior to the cervical vertebræ bounded above by the basilar process of the occipital bone, and extending downward to an imaginary line drawn horizontally through the base of the cricoid cartilage and sixth cervical vertebra and is continuous with the esophagus and larynx.

The blood supply is derived from the external carotid artery. The facial artery gives off the ascending pharyngeal, the tonsillar and ascending palatine. The superior thyroid is distributed to the upper portion of the larynx and the inferior thyroid to its lower portion.

The pharynx is subdivided into the naso-pharynx, the oro-pharynx and the laryngo-pharynx. The naso-pharynx extends to the edge of the soft palate; the oro-pharynx from this to a line drawn through the horn of the hyoid bone; the laryngo-pharynx extends from this termination to a plane drawn through the base of the cricoid cartilage.

The mucous membrane covering the pharynx is of the stratified ciliated variety. The conglomerate and follicular glands are both numerous in the naso-pharynx. The conglomerate glands are numerous over the pharyngeal surface of the soft palate and the posterior wall of the Eustachian meatus.

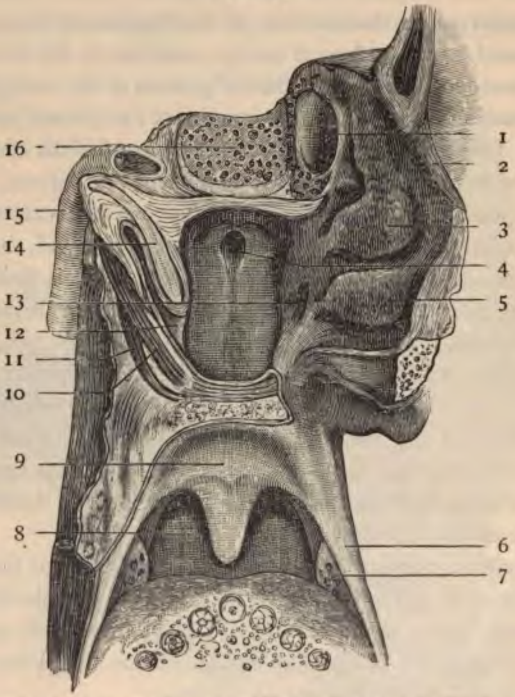
The follicular glands or the tonsil of Luschka, often spoken of as the third tonsil, occupy the vault of the pharynx, and frequently extends downward encroaching upon the Eustachian orifice. They are present at birth but should undergo atrophy about the tenth year of life.

Rosenmüller's fossæ are situated on each lateral wall of the pharynx, about midway between the Eustachian orifice and the *post-pharyn*geal wall.

The function of the naso-pharynx is that of a resonant chamber for voice modification, the preparation of warm moist air for the middle ear and lungs, and drainage for the nasal cavity.

The mucous membrane of the oro-pharynx is supplied with mucous glands. Two important glandular structures, which are part of Waldyer's lymphoid ring, namely, the pharyngeal and *lingual tonsils, are* present in this region of the oro-pharynx.

FIG. 17.



1, Sphenoidal sinus; 2, nasal bone; 3, middle turbinal bone; 4, pharyngeal bursa and naso-pharynx; 5, inferior turbinal bone; 6, anterior pillar of fauces; 7, tonsil; 8, section through posterior portion of body of sphenoid bone; 9, internal carotid artery; 10, section of cartilage of Eustachian tube; 11, Eustachian orifice; 12, section of Eustachian tube; 13, tensor palati muscle; 14, levator palati muscle; 15, soft palate; 16, buccal portion of pharynx. (*Morris*)

The posterior opening of the mouth and connection with the oro-pharynx is called the fauces. Within this chamber and constituting a part thereof is the uvula, which is a part of the soft palate, the anterior and posterior pillars, the two pharyngeal tonsils and the lingual tonsil. Between the base of the tongue and the epiglottis are the two glosso-epiglottidean pouches and three glosso-epiglottidean folds. The oro-pharynx plays a very conspicuous part in voice production and deglutition.

The anterior pillar of the fauces is formed by the palato-glossus muscle, which has its beginning at the palatine aponeurosis, and its ending at the side and back of the tongue. The posterior pillar is formed by the palato-pharyngeus muscle, which arises from the soft palate, passes downward and backward from the tonsil, joins the stylo-pharyngeus, and with that muscle is inserted into the posterior border of the thyroid cartilage below the base of the superior cartilage, and under the superior cornu. The epithelium covering the two pillars is a continuation of that of the oral and pharyngeal cavity.

Lingual Tonsil.

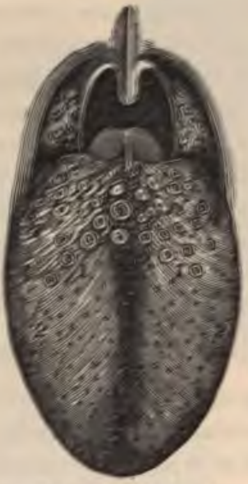
At the base of the tongue, above the glosso-epiglottic fold, and back of the circumvallate papillæ is situated the lingual tonsil, which is composed of true adenoid tissue, and which secretes a serous and mucous liquid. Small crypts lined with stratified pavement epithelium are discernible throughout the tonsil. On account of its peculiar position, irritation of this region is frequently observed. In disease covering the base of the tongue, large venous blood-vessels or varices may frequently be observed. They may cover the lingual tonsil or may make their appearance just above the tonsil, being situated bilaterally.

The Tonsils.

The tonsils (*amygdalæ*) are two in number and are situated on either side of the fauces between the anterior and posterior pillars. Their *size is* variable. They are composed of true lymphoid tissue, being a part of Waldyer's lymphoid ring, and are almond-shaped in character. On the inner surface are twelve or fourteen openings or follicles covered with stratified epithelium, which dip down into the glands.

The nerve supply is from Meckel's ganglion, and from the glossopharyngeus. The arterial supply is from the facial which gives off the lingual, palatine and tonsillar, the ascending pharyngeal from the external carotid, the descending palatine and a sprig from the small meningeal, both being branches of the internal maxillary.

FIG. 18.



1, *Papillæ circumvallatæ*; 2, *papillæ fungiformes*. (*Holden.*)

The venous supply ends in the tonsillar plexus on the outer side of the tonsil.

The function of the tonsils is imperfectly understood. By some it is thought they influence the development of the lymphocytes and leucocytes, whose functions are presumed to be the *digestion of micro*örganisms which find their way into the tonsils. The throat is moistened partially by the secretion from the tonsils and thus they contribute to deglutition.

Above the tonsils, and between the anterior and posterior pillars, is situated the fossa supra-tonsillaris. It is triangular in shape, its border being the anterior and posterior pillars. It is of especial interest on account of the frequency of peritonsillar inflammation. Frequent attacks of inflammation of the tonsils may form adhesions with the pillars producing pouches or pathological culture tubes for the propagation of infectious microörganisms.

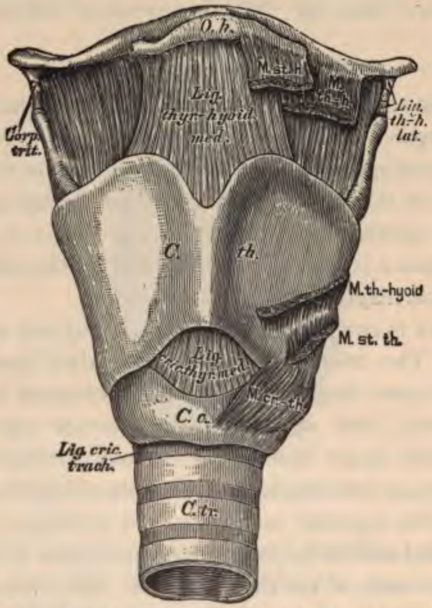
Anatomy of the Larynx.

Within the region of the laryngo-pharynx is situated the most important organ of voice and speech, the larynx. It is composed of hyaline cartilage, is situated immediately below the base of the tongue, and in direct connection with the trachea at the base of the cricoid cartilage. Posterior to the larynx is the pharynx which becomes a part of the esophagus at a plane drawn through the cricoid cartilage.

The larynx is composed of the cricoid, thyroid and arytenoid cartilages. The cricoid cartilage is so called from its resemblance to a signet ring. Its vertical measurement is one inch on its lateral wall, and rests upon the anterior superior surface. The triangular upper half of the thyroid cartilage extends outward, varying in individuals, and forms the Adam's apple (*pomum Adami*). The superior margins of the cartilages curve gently backward, and end in the long projection known as the right and left superior cornu of the thyroid. The lower margins curve in a like manner with the exception of the lower projection or the lower cornu, which is short and blunt.

To the superior cornua are attached the lateral thyro-hyoid ligaments. The inferior cornua, as shown in the illustration, are attached to the median lateral wall of the cricoid by the posterior superior cerato-cricoid and the posterior ceratoid ligaments. In front, at the elliptical space, the two cartilages are connected by the median crico-thyroid ligaments. The arytenoid cartilages are two in number, and triangular in form. They occupy a position on the superior margin of the posterior part of the cricoid cartilage, to the right and to the left of the median line. Their height is usually one half inch and their diameter one quarter inch at the base. The apex of each pyramid is capped by a small cartilage, the cartilage of Santorini. To the outside, and slightly above the cartilage of Santorini, is situated the cartilages of Wrisberg. Their anatomical position is interesting on account of the liability of this region to tubercular and syphilitic infections.

FIG. 19.



O.h., *Os.*, hyoides; *C. th.*, thyroid cartilage; *Corp. trit.*, corpus triticeum; *C.c.*, cricoid cartilage; *C. tr.*, tracheal cartilage; *Lig. thyr -hyoid med.*, middle thyro-hyoid ligament; *Lig. th.-h. lat.*, lateral thyro-hyoid ligament; *Lig. cric.-thyr. med.*, middle crico-thyroid ligament; *Lig. cric.-trach.*, crico-tracheal ligament; *M. th.-hyoid.*, thyro-hyoideus muscle; *M. st.-th.*, sterno-thyroideus muscle; *M. cr.-th.*, crico-thyroideus muscle. (*Holden.*)

The epiglottis is a fibro-cartilaginous structure situated in the median line at the base of the tongue, and projects over the larynx like a valve. Its apex is attached to the median notch of the thyroid cartilage by the thyro-epiglottic ligament. It is connected by the posterior surface of the os hyoides by the hyo-epiglottic ligament. Laterally two folds of mucous membrane connect the epiglottis with the arytenoid cartilage.

The aryteno-epiglottic folds continue backward, inclosing the cartilage of Santorini, and filling the space between the upright walls of the arytenoid cartilages. The anterior surface of its apex is attached to the base of the tongue by the three glosso-epiglottic folds.

The muscles supplying the larynx are both extrinsic and intrinsic. The extrinsic are those found outside of the larynx, and are sterno-hyoid, sterno-thyroid, aryteno-hyoid and thyro-hyoid, the function of which is the depression of the hyoid bone and the elevation of the thyroid cartilage, and the glosso-hyoid, mylo-hyoid, stylo-hyoid and hyoglossus, whose function is to elevate the larynx.

The intrinsic muscles, or the muscles within the larynx, are eleven in number, arranged in five pairs, with one in the middle. Without going into detail regarding the insertions, we will at once pass to their positions and function.

The crico-thyroid is triangular in form, connecting the cricoid and thyroid cartilages. Its function is to bring the cricoid and thyroid together, drawing the cords tense.

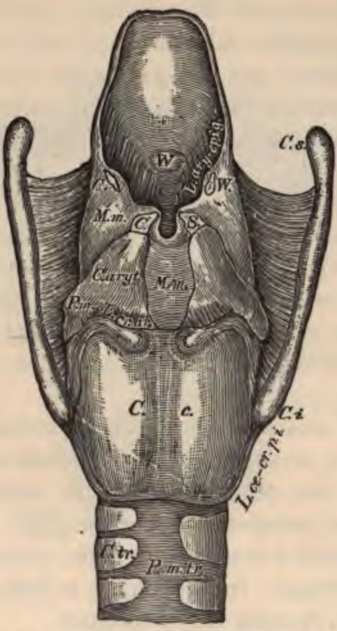
The lateral crico-arytenoid connects the arytenoid cartilage with the cricoid as shown in the illustration and its function is the approximation of the vocal cords.

The posterior crico-arytenoid extends upward and outward from the posterior surface of the cricoid to the outer angle of the base of the arytenoid cartilages. The function of this muscle is the abduction of the vocal cords.

The aryteno-epiglottideus arises from the apex of the arytenoid cartilages, passing upward and inward to the side of the epiglottis. The function of this muscle is the closing of the glottis.

The thyro-arytenoid is subdivided into two parts, the external and the internal. The main organ is from the inner angle of the thyroid cartilage, and extends backward and upward, joining the outer edge of the arytenoid cartilage. The internal part of the muscle connects with the vocal cords along its entire length. The function of the thyro-arytenoid muscles is to shorten and relax the vocal cords. The muscle may, by becoming shorter, *bring the cords in closer* apposition.

FIG. 20.

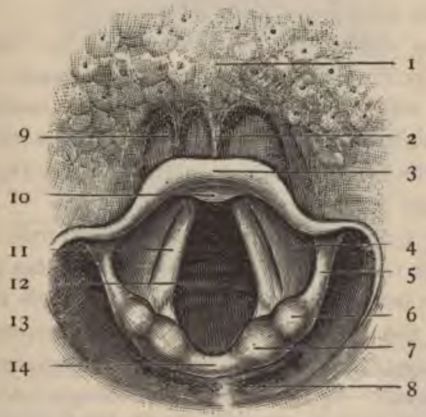


E., epiglottis cushion (W); *L. ar.-ep.*, aryteno-epiglottic fold or ligament; *M. m.*, membrana mucosa; *C. W.*, cartilage of Wrisberg or cuneiform; *C. S.*, cartilage of Santorini or cornicula laryngis; *C. aryt.*, arytenoid cartilage; *C.c.*, cricoid cartilage: *P.m.*, muscular process or external angle; *L. cr.-ar.*, crico-arytenoid ligament; *C.s.*, superior cornu; *C. i.*, inferior cornu of the thyroid cartilage; *L. ce.-cr. p.i.*, posterior inferior cerato-cricoid ligament; *C. tr.*, tracheal cartilage; *P. m. tr.*, membranous portion of the trachea. (*Holden.*)

The arytenoid is a single muscle connecting in a semicircular manner the posterior surface of the two arytenoid cartilages. The function of this muscle is to approximate the vocal cords.

The vocal cords are composed of yellow elastic tissue extending from the inner angle of the thyroid cartilage to the processus vocalus of the arytenoid cartilage. The outer surface is in direct apposition to the internal part of the thyro-arytenoid muscle. The size and length of the vocal cords vary in individuals. The normal voice with its complete range of tone is essentially dependent for its production upon the vocal cords. The general physiology of the voice will be considered under a separate subdivision.

FIG. 21.



VIEW OF INTERIOR OF LARYNX AS SEEN DURING INSPIRATION.

1, Base of tongue; 2, median glosso-epiglottidean fold; 3, epiglottis; 4, fossa innominata; 5, aryteno-epiglottidean fold; 6, cartilage of Wrisberg; 7, cartilage of Santorini; 8, pharynx; 9, vallecula; 10, cushion of epiglottis; 11, true vocal cord; 12, rima glottidis; 13, sinus pyriformis; 14, arytenoid commissure. (*Morris.*)

The ventricular bands, or false vocal cords, are so named because it is supposed they have no influence upon voice production. There are two crescentic folds of mucous membrane enclosing the superior thyro-arytenoid ligaments parallel to the true vocal cords slightly above and to the outer margin of the cords. They project into the larynx from the lateral walls and with the true vocal cords form two lateral ventricles which are named the ventricles of Morgagni. The functions of the ventricles of Morgagni which contain many mucous and serous glands is to supply moisture to the vocal cords. The ventricles contribute in a slight measure to voice production and aid in preventing the escape of air from the lungs (Brunton and Cash).

The mucous membrane of the greater portion of the larynx is covered with a stratified columnar ciliated epithelium resting upon a thick submembrane. Goblet cells are contained within the epithelium. The epithelium covering the true vocal cords, part of the arytenoid cartilages and the free margin of the epiglottis is of the stratified squamous variety.

The sudden change of the character of the epithelium, as pointed out by Frederick of Leipzig, in a measure accounts for the slowness with which acute catarrhal inflammation extends from the oro-pharynx into the larynx, and for this reason it seldom happens that an acute laryngitis or pharyngitis extends to the upper air passages.

The nerve supply of the larynx is received from the superior and inferior or recurrent laryngeal nerves, branches of the vagus. Sensory fibers from the superior laryngeal branch furnish acute sensibility to the glottis. These fibers carry impressions to the medulla oblongata, while motor impulses are transmitted by the inferior laryngeal. By this mechanism foreign bodies and irritating gases are prevented by closure of the glottis from gaining entrance to the lungs.

The inferior laryngeal nerve is supposed to supply motor impulses to all the muscles with the exception of the crico-thyroid, which receives motor impulses from the superior laryngeal.

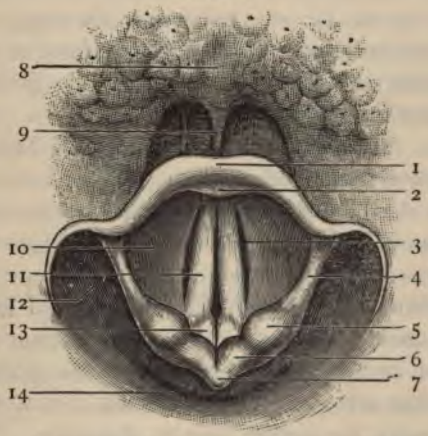
The arterial blood supply is derived from the superior and inferior thyroid arteries. "The venous supply empties into the superior thyroid veins. The capillaries are very fine and lie *directly beneath* the epithelium."

The lymphatic network is situated beneath the capillaries.

Voice and Speech.

As previously remarked, the purity of the voice is dependent essentially upon the vocal cords. The loudness, pitch, quality or timbre are dependent, to a great extent, upon the normal condition of the upper air passages. The voice is produced by certain vibrations of the vocal cords, previously approximated and tense. The force of the expired air is controlled by action of the diaphragmatic and intercostal muscles.

FIG. 22.



View of Interior of Larynx as seen During Vocalization.

1, Epiglottis; 2, cushion of epiglottis; 3, ventricle; 4, aryteno-epiglottidean fold; 5, cartilage of Wrisberg; 6, cartilage of Santorini; 7, arytenoid commissure; 8, base of tongue; 9, median glosso-epiglottidean fold; 10, fossa innominata; 11, true vocal cord; 12, sinus pyriformis; 13, processus vocalis; 14, pharynx. (*Morris.*)

The speech area is situated in the base of the third frontal convolution. From this area emanate impulses which pass along appropriate fibers of the pyramidal tract of the bulb, and these produce impulses by which the word is spoken (Foster). In coördination of the muscular movements of the larynx, paralysis of the different conducting fibers, disease of the cortical centers, or disease of the vocal cords, may result in partial or complete loss of the voice. One great essential to voice production is a clear understanding of the function of respiration. Three methods of breathing are universally known, clavicular, costal and diaphragmatic or abdominal. Among singers all these methods have been extensively advocated. The clavicular probably has fewer advocates than the other two. The diaphragmatic method offers the greater advantage in the production of pitch and quality in the voice. In the abdominal method of breathing a greater amount of air is taken into the lungs, and steadiness, power and volume are added to the force of the expired air. The greater the number of vibrations in a given length of time, the higher the pitch of the voice.

During rest, the larynx is seen to be open. This is also the normal condition during respiration. The cadaveric condition is that seen in death. The glottis is much narrower at this time than in health. The vocal cords with the cartilages of Santorini are more or less approximated according to the note sounded, or the word spoken. It is only by assuming a rigid position that the cords are set in vibration. When the recurrent laryngeal of one side is cut or paralyzed, the shape of the glottis changes. The cord on that side remains at rest, while that of the opposite side approximates the median line in phonation. In bilateral paralysis the abductor muscles fail to respond to stimulation, inspiration is disturbed and the voice is lost.

When the recurrent laryngeal is stimulated the cords are brought into apposition. Voices are classified according to range, into soprano, mezzo-soprano, contralto, tenor, baritone and bass. The range of tone of the voice is dependent upon the size and length of the vocal cords, combined with the peculiar coördination of the muscular structure of the larynx, which necessarily varies with individuals. The old theory that the difference in the bass and tenor voice is dependent upon the length of the vocal cords is, in a great measure. erroneous. The size of the larynx varies, being larger in men than in women. At the age of puberty in boys the voice undergoes rapid change in pitch. During this metamorphosis more or less congestion of the mucous surface is present, all of which accounts for the peculiar tone of the voice which is noticeable at this period of life.

In addition to the larynx or organ of speech and voice, it is also apparent that the tongue, palate with its varied arched conditions, nasal and post-nasal spaces, teeth and lips all on their part, add a well-observed character to the voice.

Speech is a combination of vocal sounds, these sounds being classified as vowels and consonants, and are joined together to make syllables. Speech may be distinguished from singing, partially by the fact that the sounds in the first case are more especially articulate, or formed in the mouth, while in the latter their quality is only modified by the mouth.

In singing the tone is sustained at the same pitch for a considerable length of time, while in speaking the voice is continually sliding up and down on the vowel sounds (Henry Sewall).

Pathology and Bacteriology of the Ear, Nose and Throat.

It is not the province of the writer to go into detail in regard to the pathology and bacteriology of the upper air passages. The pathology of each disease will be referred to under separate diseases.

Heredity naturally plays a very conspicuous part in the causation of disease. In the child born into the world with every cell perfectly formed, every organ normal as regards its position, the chance of disease is reduced to the minimum. On the other hand the child born with a tendency to tuberculosis, syphilis or other infectious diseases, whether it be germinal infection or post-germinal ante-natal infection, is predisposed to all forms of disease, from birth to death. Environment adds to the chance of infection, and in consequence our clinics are filled with a great variety of cases differing in pathological symptomatology from that observed in private practice.

The healing of wounds and the cure of disease is dependent upon many conditions. *Vis medicatrix naturæ* must have the assistance of certain specific forms of therapy, otherwise results will be unsatisfactory.

In the cure of an old suppurating middle ear, we must have phagocytic activity. Secreted intercellular fluid and blood-serum must possess certain antitoxic constituents in order to antagonize germ-production, and cellular reproduction must exceed cellular death, supplemented by thorough cleansing by means of antiseptic application, ere we can successfully treat the disease. The cause of inflammation of the ear, nose and throat varies in no wise from that of any other organ of the body, and is traumatic, chemical or bacterial in origin.

Disturbance in circulation of a certain part is dependent upon an irritation in the nervous system, which increases or lessens arterial tension. A knowledge of the vaso-motor system which supplies the vaso-constrictor, vaso-dilator fibers and the perivascular ganglion is of paramount importance. Hyperemia, anemia and inflammation is the logical sequence of any irritant that may be of sufficient potentiality to cause a change of local blood supply. The hyperemia may be of a very mild character, soon passing away, leaving the capillaries and their endothelial cells in a normal condition, or the irritation may be great enough to bring about inflammation, characterized by exudation in the mucosa and a production of pathological conditions as seen in acute inflammation of the Schneiderian mucous membrane, acute otitis media, pharyngitis, etc. Such active changes may go on to the point of suppuration or death of a localized area as observed in diphtheria, or may terminate in resolution.

Hypertrophy, hyperplasia, atrophy and various forms of degeneration all result from circulatory disturbance affecting cellular growth.

On account of the cutaneous covering of the ear there is little to be said in regard to bacteriology of this region. The most frequent organisms causing disease of the auricle are staphylococcus pyogenes aureus, seen in furuncles, and streptococcus pyogenes found in erysipelas.

The cocci involving the middle ear are of greater variety, usually finding their entrance through the Eustachian tube or by traumatic injury through the membrana tympani. Among those found as active causes of inflammation in the middle ear are the streptococcus pyogenes, occasionally the tubercle bacillus, pneumococcus of Fränkel, Pfeiffer's bacillus of influenza, the bacillus of Friedlander and the staphylococcus pyogenes albus and aureus.

The nose and mouth being the avenues of the entrance of air, thousands of bacteria find their way to these cavities daily; fortunately their reception is antagonistic to their growth and reproduction, and they remain innocuous.

In the nose may frequently be found the staphylococcus pyogenes aureus, diplococcus of Fränkel and Weichselbaum, tubercle bacillus found in those living with tubercular patients, and Klebs-Loeffler bacillus of diphtheria. These bacteria are innocuous, though at any time a lowering of vitality or irritation of the tissues may cause them to become sources of active inflammation. It is thus found necessary that we take the same precautions in preparing our cases for any surgical operation in the nose and after dressing as the abdominal surgeon would in laparotomy.

The mouth and pharynx are open to infection through the medium of food and water, through air breathed directly into the mouth or through the nasal cavity.

The mouth is deprived of ciliated epithelium, or vibrissæ to antagonize the entrance of bacteria, consequently when open and especially in mouth breathers great numbers of organisms find entrance.

Within the teeth and tonsils food particles often find lodgment, become infected and produce ptomains which are potent factors as a cause of acute pharyngitis and laryngitis.

We previously called attention, under the anatomy of the tonsils, to the presence within the tonsils of polyformed nuclear leukocytes, which in a measure destroy bacteria, finding entrance into the crypts of the tonsils. Within the mouth and pharynx in active catarrhal or ulcerated conditions may be found the streptococcus pyogenes, staphylococcus pyogenes aureus, albus and citreus.

The Klebs-Loeffler bacillus is present in diphtheria, in tonsillitis the streptococcus pyogenes or the bacillus of Friedlander. In those cases suffering with tuberculosis of the lungs the tubercle bacillus will be found in great numbers. The bacillus of typhoid fever may be present often in the mouth of those suffering from typhoid fever, the leptothrix in the teeth, and as a cause of mycosis tonsillaris, the ray fungus as a cause of actinomycosis, and the bacillus of glanders, associated with glanders as a general disease.

Particles of dust entering the larynx are expelled by the ciliated epithelium. By the sudden close of the glottis foreign bodies entering the larynx and the accumulation of mucus are expelled by a reflex act of coughing. The larynx is freer from bacteria than any other portion of the upper respiratory tract. The trachea is presumed to be free from organisms in health. The blood may be one avenue of infection. Weiber and Liel have called attention to the inflammation of the middle ear due to malaria. Metastatic abscess of the external auditory canal is observed in gonorrheal infection.

Examination of the Ear, Nose and Throat.

It will be found advisable to pursue some form for the systematic examination of the ear, nose and throat. Many forms have in the past been suggested, varying in each to meet the individual habits of the examiner.

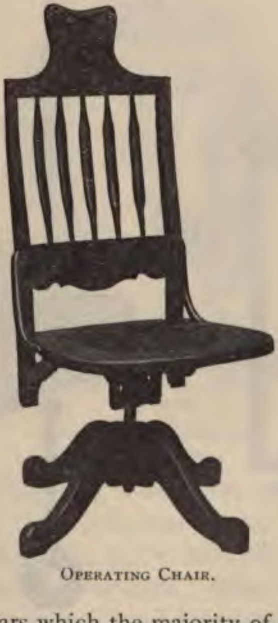
By pursuing a systematic method, varied of course to meet individual conditions as they may present, a record of each case may be secured which even in after years may be of great value. Habit in examination is easily acquired and when once formed is often a detriment. System and habit are two conditions and *should not* be confounded. Mechanical aids to examination will be considered under mechanical aids to therapy to prevent repetition.

Mechanical Aids to Therapy.

After study and training in the department of medicine under consideration, a wise selection of mechanical appliances is essential to a perfect technique in the examination and treatment of the ear, nose and throat.

By the exercise of care in the choice of such instruments as we will endeavor to designate as having practical value, the student may save many dollars which the majority of specialists have expended in the effort to secure appliances of real value.

FIG. 23.

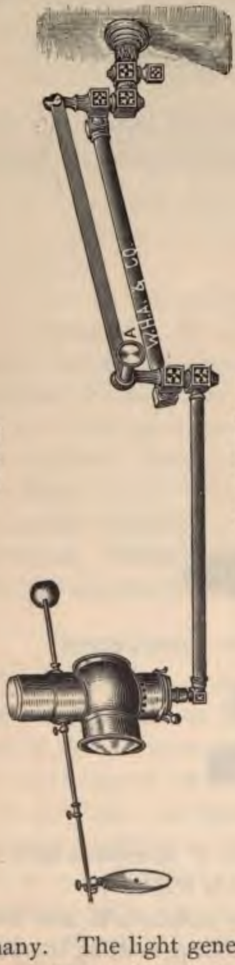


OPERATING CHAIR.

It is to be remembered that appliances soon tarnish, and those of metal should be frequently replated, thus permitting thorough cleansing and sterilization.

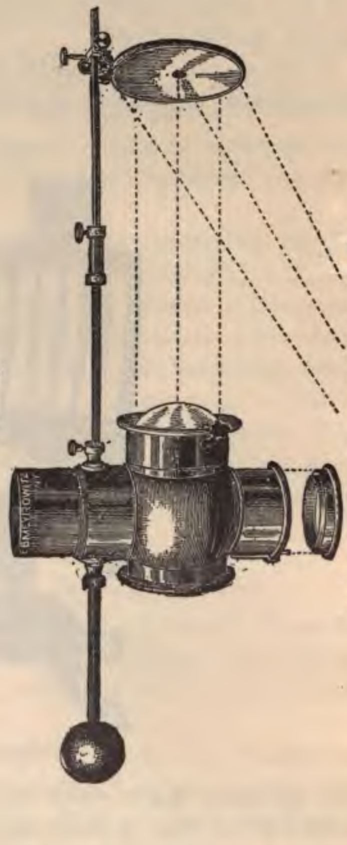
For examination the patient should sit upon a revolving chair, facing the operator. The chair in the illustration was suggested by the old operating chair of Sir Morell Mackenzie, familiar to

FIG. 24.



ADJUSTABLE LAMP.

FIG. 25.

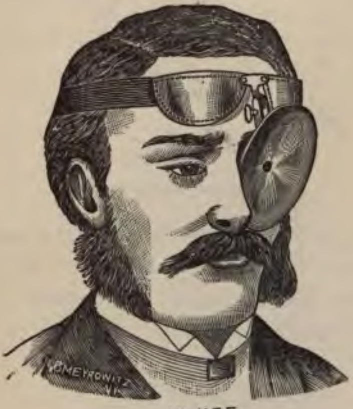


McKENZIE'S CONDENSER AND REFLECTING MIRROR.

many. The light generates preferably from a small electric light in a student lamp, or light condenser especially constructed for the purpose. This is placed to the left of the patient, behind, and on a level with the ear, the chair being elevated and lowered to meet requirements.

The adjustable head mirror, as illustrated, is more satisfactory than any other. It should be placed in front of the eye as shown in the illustration. A great many otologists and laryngologists use light condenser with mirror attached to a long slender rod in office work (Fig. 25). It is the author's observation that this method as a routine practice of manipulating the mirror, seriously handicaps the skillful bed-side examination and operation upon changing to the head-mirror.

FIG. 26.

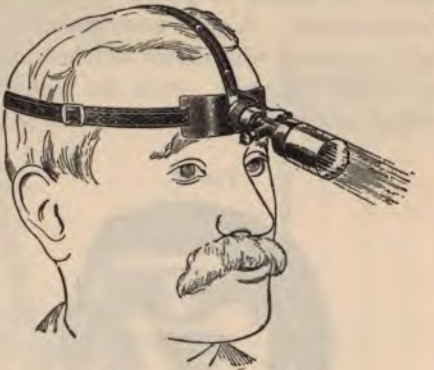


ADJUSTABLE HEAD-MIRROR.

The electric head-mirror, as the stationary mirror, has many advantages as well as disadvantages. When used for any length of time it becomes very warm and disagreeable to the operator. For transillumination, as a diagnostic measure in disease of the antrum of Highmore, frontal and ethmoidal cells, many lamps are devised. Those shown in the illustration will enable the operator to come to a conclusion as nearly positive as any other

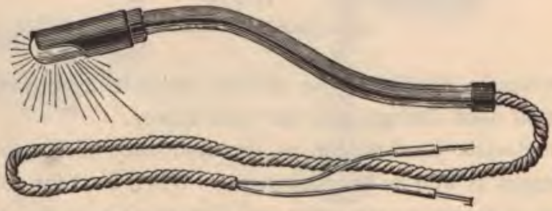
Information gained in this way is, after all, not always reliable. The coloring of the mucous membrane of the ear, nose and throat depends essentially upon our form of illumination. A pure white light only can show the normal condition. Whether the light emanate from acetylene burner, electric light globe, natural, artificial gas, Welsbach, or natural sunlight, we soon learn to detect abnormal coloring.

FIG. 27.



ELECTRIC HEAD-MIRROR.

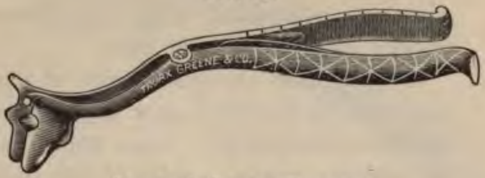
FIG. 28.



INSTRUMENTS FOR TRANSILLUMINATION.

The bivalve speculum is one devised by Pynchon for examination and therapy. Speculums of this character are more sat- tory for quick work than the self-retaining speculums. The latter are valuable for operative work, since the arm becomes very tired from any prolonged unnatural position.

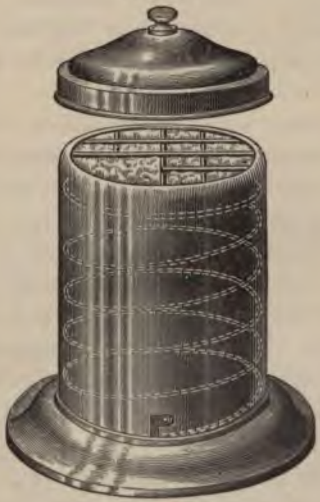
FIG. 29.



PYNCHON'S BIVALVE SPECULUM.

Cotton holders are a matter of choice. The one illustrated (Fig. 30) is very neat and satisfactory.

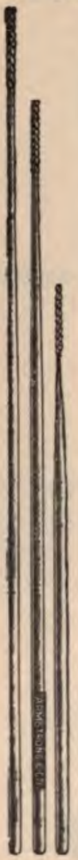
FIG. 30.



COTTON HOLDER.

Cotton carriers should be of plated metal and selected with care. Those for post-nasal and laryngeal application shou admit of being bent to meet the indication, as no fixed angle will be satisfactory (Fig. 31).

FIG. 31.



COTTON CARRIER.

The Wild's serrated ear-forceps will be indispensable in the treatment of nose affections and a great advantage over many (Fig. 32) forceps recommended for dressing in the nose.

In many cases the examination of the post-nasal space and its therapy is quite impossible without the aid of a uvula retractor. Those known as self-retaining meet the greatest number of indications. In the adjustment of the same the operator must show care and rapidity of movements, likewise in the removal, for after medication to the post-nasal space the patient often becomes quite unmanageable from the involuntary contraction of pharyngeal and palatine muscles. The palate retractor is necessary to a thorough examination or treatment of the post-nasal space supplemented by Fränkel's rhinoscope (Fig. 35).

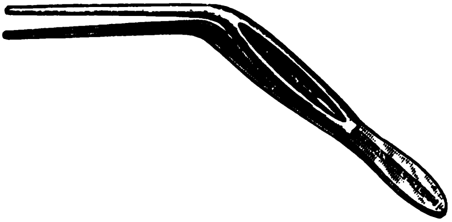
Fränkel's rhinoscopic mirror is more especially for the examination of the post-nasal region. The mirror can be passed up behind the uvula without exciting muscular reflex. To prevent frosting it may be covered with ordinary soap and carefully wiped dry with a napkin, or the mirror may be heated by holding the metal side over the lamp.

The tongue depressor as suggested by D. Braden Kyle recommends itself on account of the adjustability of and length of its blade, and the ease with which it is sterilized.

The laryngeal mirrors varying in size from three to eight are all in universal use. They should be heated by holding the metal side over the lamp before inserting or receiving an application of soap and dried afterward. The gest mirror possible gives a proportionate image (Fig. 36).

For the application of drugs to the larynx and vocal cords, the laryngeal brush is highly recommended and possesses many advantages over the cotton holders. The brush is of soft camel's hair.

FIG. 32.



WILD'S EAR-FORCEPS.

Cohen's laryngeal cotton forceps is an instrument suitable for intra-laryngeal applications as shown in the illustration (Fig. 37).

By means of the Dench middle ear vaporizer (Fig. 34) any medicine indicated in the treatment of the middle ear and the Eustachian tube which vaporizes at the ordinary temperature can be conveniently used.

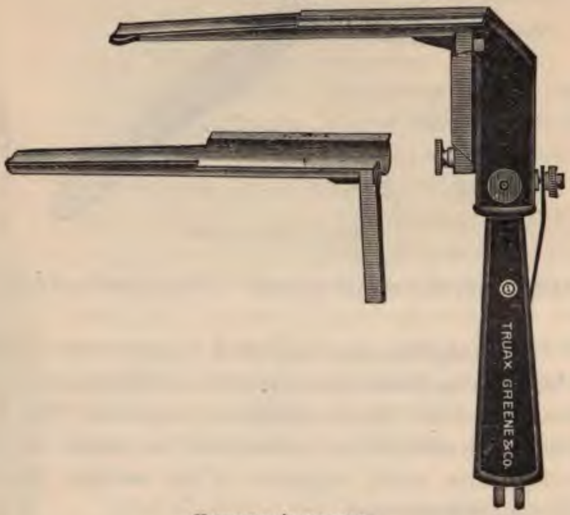
A small amount of cotton is saturated with the medicine and placed in the bottle. The thumb screw enables the operator to control the amount of vapor forced into the ear. It is always best first to inflate the tube and middle ear by air, and to follow immediately with the medicated vapor.

Eustachian bougies are filiform in character, of hard rubber. With the aid of the Eustachian catheter they may be passed through the Eustachian tube into the middle ear. The passage of these bougies is sometimes attended with great pain and danger. Their indication must be thoroughly understood.

The flexible middle ear catheter is of soft rubber and is of a size small enough to be passed through a No. 3 silver Eustachian catheter and thence far up into the Eustachian tube. By the use of the soft catheter fluids such as solution of pilocarpine, camphoroxol, etc., can be passed into the middle ear.

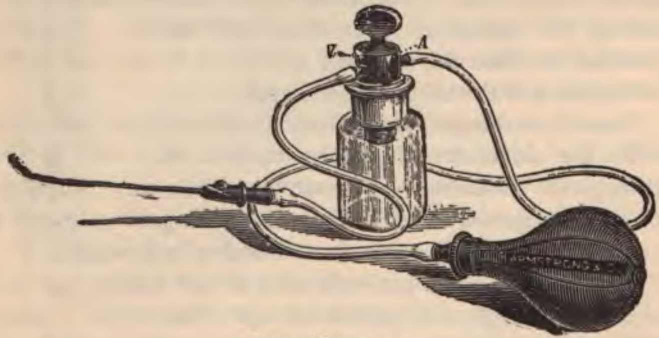
Autoscopy. — This subject can be conveniently mentioned here as an adjunct to therapy. In 1895 Kirstein, of Berlin, invented

FIG. 33.



KIRSTEIN AUTOSCOPE.

FIG. 34.

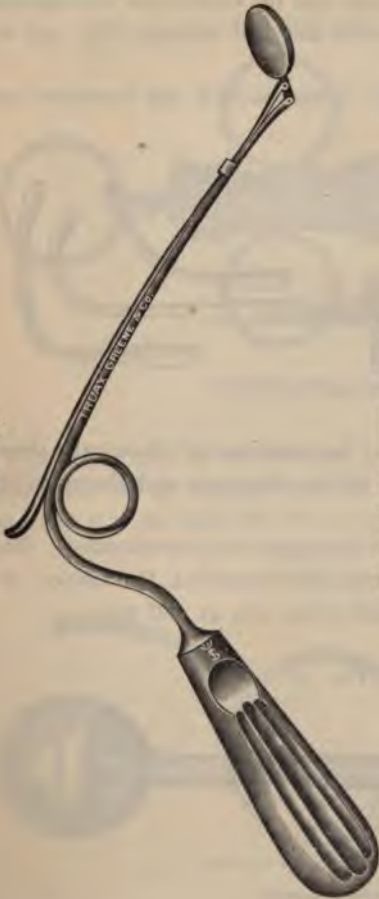


DENCH VAPORIZER.

the autoscope (Fig. 33). A skillful manipulator can by this *hod secure* a direct view of the pharynx, larynx and trachea.

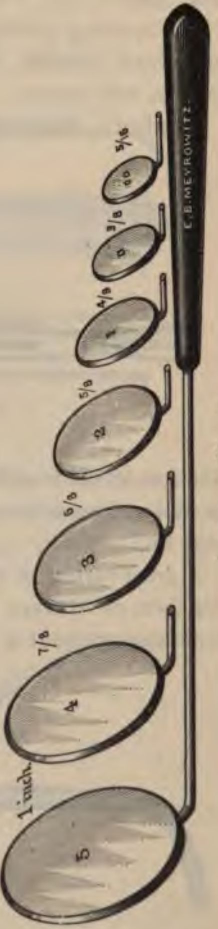
Application can thus be made direct to the parts, one advantage over treatment with the image view. The author has used the autoscope to great advantage in the removal of an oyster shell and foreign bodies submerged in the larynx.

FIG. 35.



FRÄNKEL'S RHINOSCOPIC MIRROR.

FIG. 36.



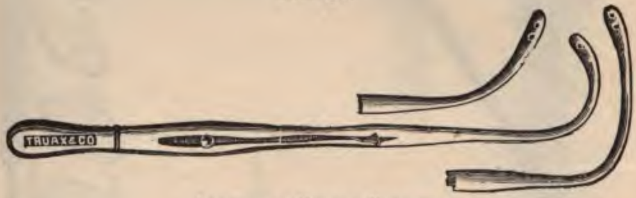
LARYNGEAL MIRROR.

Powder-blowers soon become a source of trouble to the majority of operators, none possessing any superior advantage (Fig. 38).

For injecting medicated oils into the middle ear through the Eustachian catheter, the Anel's lacrymal syringe (Fig. 39) answers as well as any.

Toynbee's diagnostic tube is necessary in the treatment and inflation of the middle ear. No treatment of these parts should be undertaken without this aid to diagnosis and therapy (Fig. 40).

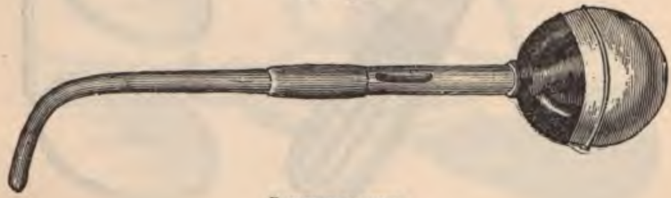
FIG. 37.



LARYNGEAL COTTON FORCEPS

A great variety of massage otoscopes are recommended. Since this form of therapy is constantly demanded, the choice of a durable instrument is essential (Figs. 41, 42 and 43).

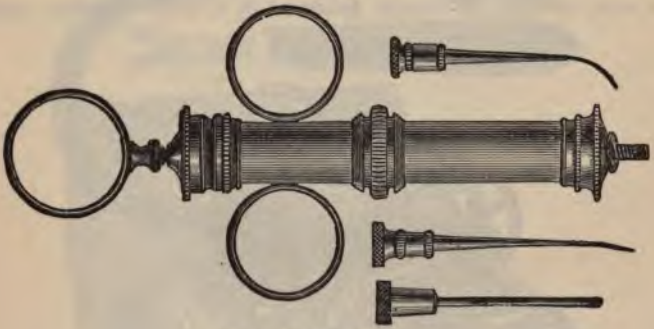
FIG. 38.



POWDER-BLOWER.

Those with the motive power furnished with electricity and air , *in the end, prove* as satisfactory as those manipulated by hand, as the Siegel, Bishop or Ballenger. In the latter the disadvantage and danger of having the drum obscured, as in the Delstanche, is remedied by having it attached to the Siegel otoscope.

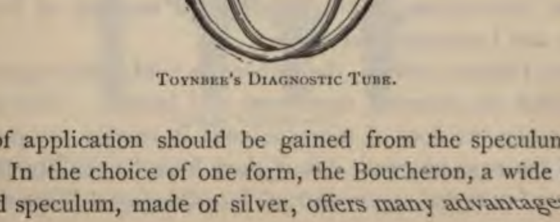
FIG. 39.



ANEL'S LACRYMAL SYRINGE.

The deeper part of the auditory meatus can be seen as a rule only by the aid of the ear speculum. Both in examination and treatment it is essential that the greatest space possible and freedom of application should be gained from the speculum (Fig. 44). In the choice of one form, the Boucheron, a wide funnel-shaped speculum, made of silver, offers many advantages.

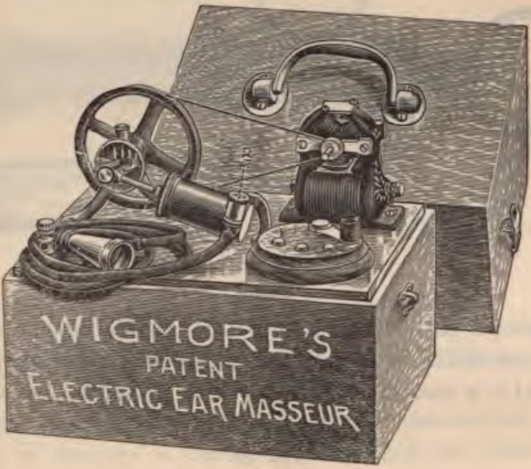
FIG. 40.



TOYNBEE'S DIAGNOSTIC TUBE.

The Eustachian catheter should be of malleable silver, of four sizes, one, two, three and four respectively. The number three is probably the one most often used (Fig. 45). Before trying to introduce the catheter, it is best to examine the nasal passages for any obstructions. The nose should first be sprayed with two per cent. solution of cocain, followed by a warm alkaline spray or douche, to free the nasal and post-nasal regions of any secretions which might possibly be forced up into the Eustachian tube. The catheter should be dipped in boiling water or pure alcohol, dried, oiled with carbo-vasolin, and placed in position. For the introduction of the catheter the methods of Politzer, Gruber and Lowenberg are in use.

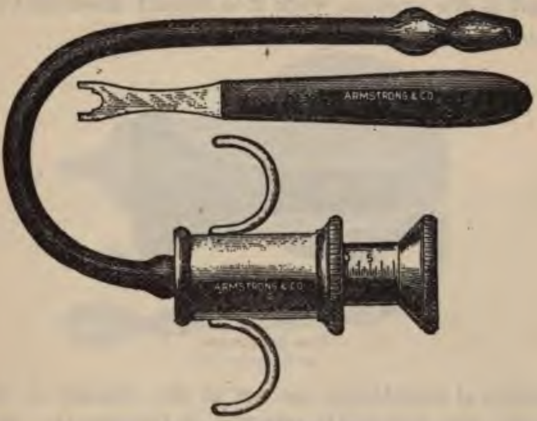
FIG. 41.



WIGMORE'S MASSEUR.

In the Politzer method, the catheter is held in the right hand, the curved tip pointing downward and inward. It is quickly passed along the floor of the nose until it reaches the posterior wall of the naso-pharynx. It is then brought slightly forward *and* turned outward, again carried forward across Rosenmüller's fossæ, when it is again turned outward and upward into the mouth of the Eustachian tube.

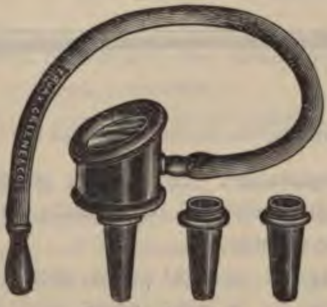
FIG. 42.



DELSTANCHE'S MASSEUR.

In the Gruber method the tube is passed quickly backward until it strikes the naso-pharynx. It is then rotated to the septum and brought forward until it strikes the soft palate, when it is turned outward and passed into the Eustachian tube.

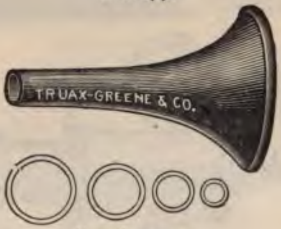
FIG. 43.



SIEGEL'S OTOSCOPE.

The Lowenberg method resembles the method of Gruber, in that the catheter, after reaching the wall of the naso-pharynx, is turned on its axis, and brought forward until it strikes the posterior end of the septum, when it is rotated downward and outward into the tubal opening.

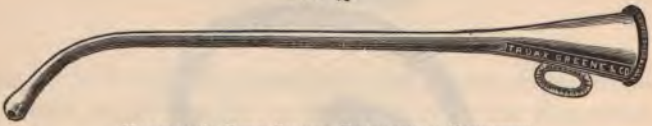
FIG. 44.



EAR SPECULUM.

Pathological laboratories are not at the disposal of all young men doing more or less work in our department. In microscopical work it is very essential that careful attention be given to the technique of mounting, staining, etc. Many diseases are impossible to differentiate without the aid of the microscope as a means of examination. In fact the physician without this essential aid to diagnosis will be fearfully handicapped in his efforts at scientific therapy.

FIG. 45.



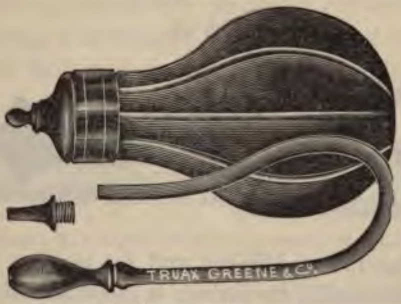
HARTMAN'S PURE SILVER EUSTACHIAN CATHETER.

The Politzer bag, six- or eight-ounce, should be provided with a short rubber tube, six or eight inches long, joining to a hard-rubber tip which fits the catheter.

By this all forcible movements of the tubes are prevented *in situ* (*Fig.* 46).

For the removal of excrementitious matter from the external auditory canal, middle ear, post-nasal space, and the treatment of the middle ear and larynx, certain syringes are of special value. For the removal of cerumen exfoliation, pus, etc., from the auditory canal, the two-ounce syringe of glass or metal are especially recommended.

FIG. 46.



POLITZER BAG.

In the use of the ear syringe the following rules have been deduced from Dench, on "Diseases of the Ear":

1. Fluids should be used warm, *i. e.*, temperature of 100°–115°.

2. In the removal of cerumen the stream should play in one direction, that of the least resistance.

3. Too much force may bring about destructive inflammation or syncope.

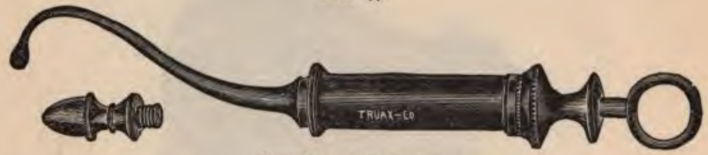
4. Antiseptic fluids only of mild character should be used, thus causing no consequence upon entering perchance into the middle ear, by rupture of the drum or old perforations.

5. That sudden removal of cerumen may bring about an effusion into the middle ear.

The condition demanding the use of the post-nasal syringe is a limited one. They may be made of hard rubber or plated metal. They are to be used only when there is something to remove, and when other methods are unsatisfactory or not at the disposal of the physician.

The laryngeal syringe (Fig. 48), preferably of metal, differs from the post-nasal. In this the tube is curved at a greater angle, sloping to a point.

FIG. 47.

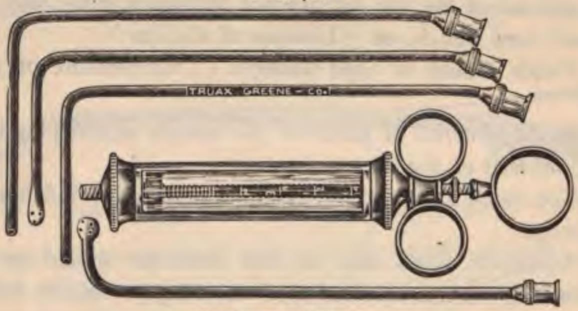


POST-NASAL SYRINGES.

For cleansing the middle ear and for making local applications, the Blake middle-ear syringe is especially indicated.

In passing the tube into the middle ear great care is enjoined lest an injury to the tissues result. Medication to the attic is especially efficacious when thus applied. In many cases of acute and chronic suppuration of the middle ear, when the perforation is large, Bishop's ear aspirator (Fig. 49) is sometimes of value in drawing great quantities of pus, and even aborting infection of the mastoid.

FIG. 48.



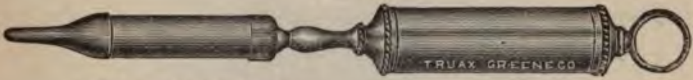
LARYNGEAL SYRINGES.

The Delstanche Masseur answers the same purpose. Care should be exercised for fear of causing a slight hemorrhage.

Small quantities of medicine, after being warmed, are best dropped into the ear with specially constructed droppers.

Bottles and droppers manufactured by Bausch and Lomb, presenting a neat appearance will be found convenient for office work. The stopper or dropper fits air-tight and the rubber nipples are durable and easy of manipulation.

FIG. 49.



S. S. BISHOP'S EAR ASPIRATOR FOR CLEANSING THE MIDDLE EAR.

The fountain cuspidore, as illustrated (Fig. 50), is the ideal way of disposing of fluids and excrementitious matter from the nose and throat. Those who do not take advantage of this method in the treatment of the nose and throat more often use a large porcelain bowl or small cup.

For refuse cotton, a wide, deep receptacle is far preferable to the small metal ones. Rockwood jars are artistic and lend a neat appearance to the operating table. They are easily cleaned, an advantage over those of metal. Nothing is more repulsive to the sight than soiled cotton or gauze.

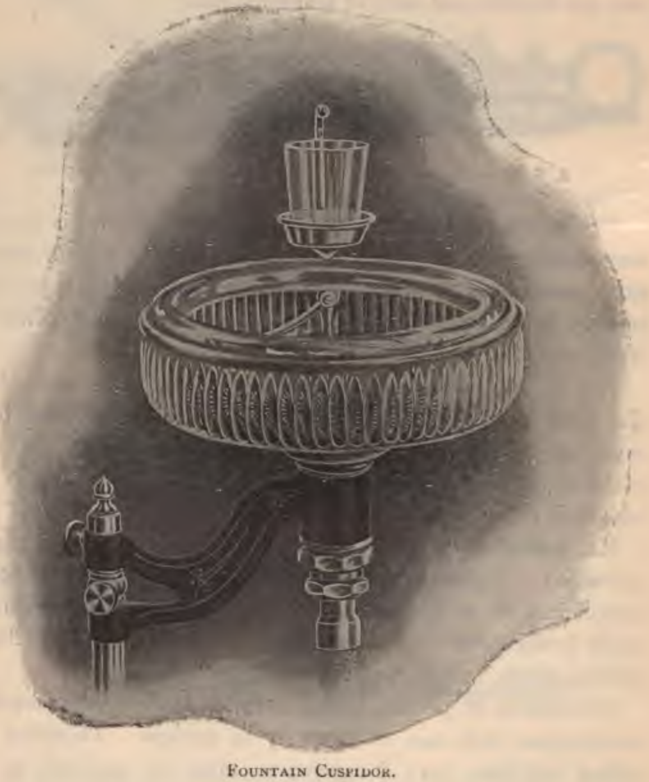
Ear basins may be of papier-mâché, hard rubber, glass or porcelain. Those of hard rubber are very light. Those of porcelain have an advantage over the others in that they are not easily broken and do not lose their shape if left for any time in boiling water, as the hard-rubber or mâché.

Cleanliness of person, combined with care in the cleansing of instruments, will ease the journey to success. Therefore individual napkins, very inexpensive, must be supplied to each patient and fresh clean napkins used for drying the instruments before using. The patient must know that every precaution is being taken to avoid possible chance of infection.

Compressed Air, Sprays, Nebulizers, Inhalers and Douches.

In beginning a consideration of this subject we wish to call attention to the universal overuse of sprays. It is to be remembered that the mucous membrane of the nose is very delicately constructed and by nature was never intended for the forcible injection of fluids.

FIG. 50.

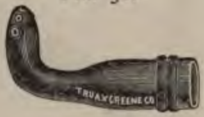


FOUNTAIN CUSPIDOR.

Cylinders for compressed air should possess an air meter, so that the air pressure injected into the nose and throat can be modified to the individual demands. The methods followed by many practitioners of trying to regulate the pressure by the cut-off, is unsatisfactory and unscientific. The air supplied to the cylinder is usually through hydraulic or hand pumps, though many offices are now supplied with air pumped from a central station. Under such circumstances the pressure is so strong that it can only be controlled by cylinder and air meter.

The Davidson hard-rubber sprays for cleansing are in universal use. For the cleansing of the post-nasal space the post-nasal tip (Fig. 51) is of great advantage. By this method the stream is thrown in a fan shape, spreading out over the entire fossa. It being large is more easily passed behind the palate, acting if necessary as a retractor.

FIG. 51.

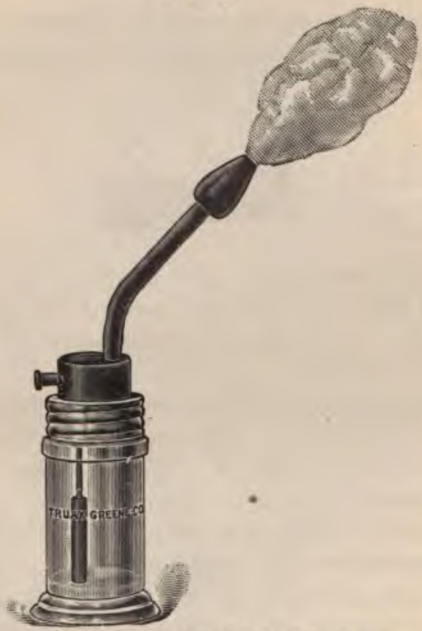


The hand nebulizer offers advantages of cheapness over the multiple nebulizer. One or the other is indispensable in the medication of the middle ear. By this method of treatment, medicines three or four times stronger than those used in an ordinary spray can be forced, and reach points where fluids cannot. Different nozzles are provided to meet individual cases. The illustration (Fig. 52) shows the Davidson spray in a heating device (Fig. 53) for keeping solutions at a uniform temperature. The source of heat is a small electric light globe. Fluids injected into the nose and throat warm are more quickly absorbed and less likely to irritate.

Atomizers of varied form and manufacture are on the market. Few possess any great value. Those simple in construction with platinum-lined tips are more satisfactory for home treatment. By teaching the patient care in the use of the atomizer, he soon learns to throw the spray to any portion of the anterior region and post-nasal space, without irritating the turbinated bones and septum.

Steam inhalers are highly recommended. They consist of a spirit lamp, water reservoir, and bulb-tube, mid-way of which is placed a sponge in which the fluid to be inhaled is placed. The steam from the boiling water in passing through the sponge is impregnated with the medicine, and by deep inhalations is carried into the larynx and bronchi.

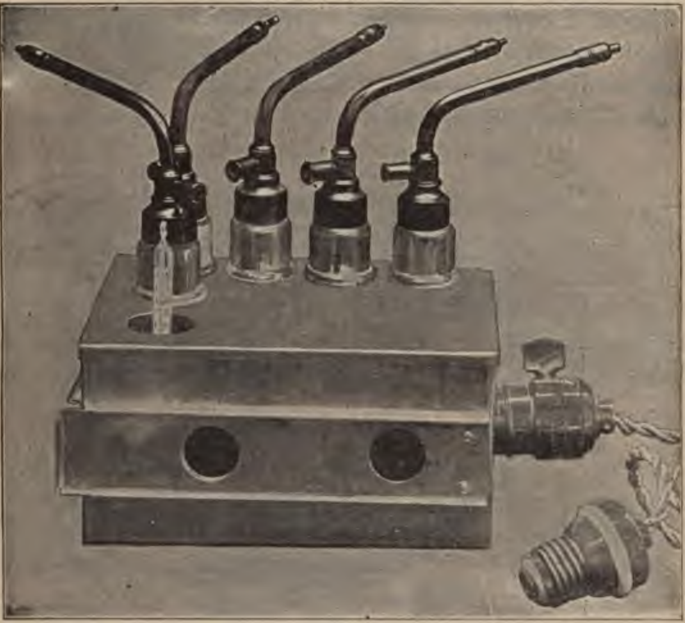
FIG. 52.



TRUAX GREENE CO. HAND NEBULIZER.

Simple methods can be devised, and very cheap instruments be purchased, as those made up of tin with short wooden stem attached. The medicine is added directly to the water. The menthol and formaldehyd inhalers which are so universally sold throughout this country are elements of harm if persistently used, in that they become in time active irritants. Camphor-menthol inhalers are more especially palliative and healing. The majority of inhalers of this character after using for any length of time are irritating to the mucous membrane. Those known as formaldehyd and menthol inhalers are conceived by men with little knowledge of the therapy of the nose and throat; therefore, are unworthy of recommendation.

FIG. 53.



ATOMIZER, HEATING DEVICE.

Gargle.

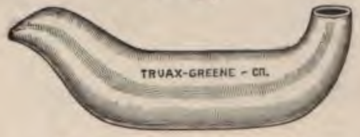
Unless used scientifically solutions prescribed for this method of treatment are of little value, especially in the treatment of the posterior pillar of the tonsils, pharynx and larynx. Investigation by Pope of San Francisco, with methylen blue, mucilage and magnesia when used as a gargle, shows that the pharynx remains untarnished, while the tongue, hard palate and anterior pillars were covered with the pigment.

Should it be found necessary to recommend gargles, patients should be instructed to fill the mouth with the fluid, close the nose tightly, throw the head back and gargle. By this method fluids will reach the pharynx and posterior walls of the tonsils.

Douche.

This form of application of medicated water, especially to the nose, has in recent years been almost relegated to the past. For cleansing and treating the nasal cavity it was first introduced by Weber of Halle, Germany. The author of this method recommends that the reservoir should not be elevated above the eyebrows. This is done in order to lessen the liability of the entrance of fluids during the act of swallowing into the Eustachian tube when it might pass into the middle ear, causing severe inflammation. The danger of using the douche must not be underestimated, since disturbance in the sense of smell, headache and suppuration of the middle ear may be occasioned.

FIG. 54.



BERMINGHAM NASAL DOUCHE.

Since Weber introduced this method a great many douches have been devised. The Kirkpatrick and Bermingham douches are more highly recommended. Those instruments should be held gently in the nose, allowing the fluid to flow naturally and without the assistance of the patient in snuffing through the nose. The long-continued use of the douche is to be condemned, in that it may act as an irritant, and thus aggravate rather than palliate disease.

Lichwitz recommends that the douche should be used only when there is something to remove, as increased secretions and crusts. Following this mode of treatment the nasal cavity should be carefully cleansed with cotton and probe, after which some bland applications should be made.

MISCELLANEOUS AIDS TO THERAPY.

Many characteristics of secretions of the ear, nose and throat can be demonstrated only by the sense of smell.

Perforations of the drum can be demonstrated by the hissing sound caused by the passage of air through the diagnostic tube while inflating with the Politzer method. Again if the perforation is large, by inflating with the nebulizer the vapor will be seen exuding from the ear.

Auscultation.

Sounds heard in respiration and phonation may be invaluable in the diagnosis of laryngeal and tracheal stenosis, the presence of foreign bodies, movable tumors, etc.

Touch.

In the examination of the auricle, the mastoid and many conditions of the throat and larynx, the touch is invaluable. It will aid in diagnosing any abnormal shape or condition of the larynx, or the condition of its surface, approximation of the cartilage, sensitive areas, foreign bodies imbedded in the tonsils and peritonsillar abscess.

Valsalva's Method.

This method of inflating the middle ear by taking a deep breath, closing the nostrils and mouth and forcibly trying to expel air through the nostrils now has the condemnation of all authorities.

Two Other Methods.

Inflating the middle ear, by means of the Politzer bag. The following methods are more especially used for children :

1. By taking a small swallow of water, holding the mouth closed, nose closed with tip of the finger and nose piece, patient is instructed to swallow with closed mouth. The bag is pressed at the count of three as in other methods.
2. By pronouncing certain sounds, such as "K" in quick succession, thus momentarily closing the naso-pharynx, then compressing the bag as above, air is passed into the tube, and into the middle ear.

Instrument for Holding Laryngeal Mirror.

Marc Paunz recommends for this an oval ring, which is to be held in the mouth of the patient. On the left side is a ball-and-socket joint, in which the mirror is held by a screw, permitting its being moved in any direction. By this method both hands of the operator are free. In one hundred operations Paunz found the instrument easily retained by the patient.

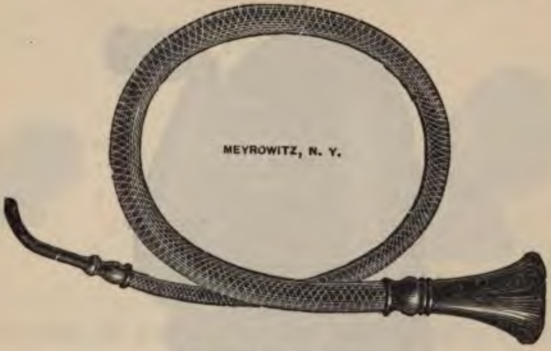
MECHANICAL AIDS TO HEARING.

Various devices have, from time to time, been introduced as aids to hearing. It is essential that the physician know something of the relative value of such instruments.

The conversation tubes are powerful conductors of the human voice. They consist of a hard-rubber trumpet-shaped mouthpiece, of variable size to collect the sound waves, a small ear piece of hard rubber, a conical elastic tube of spiral wire covered with rubber and woven silk or mohair (Fig. 55).

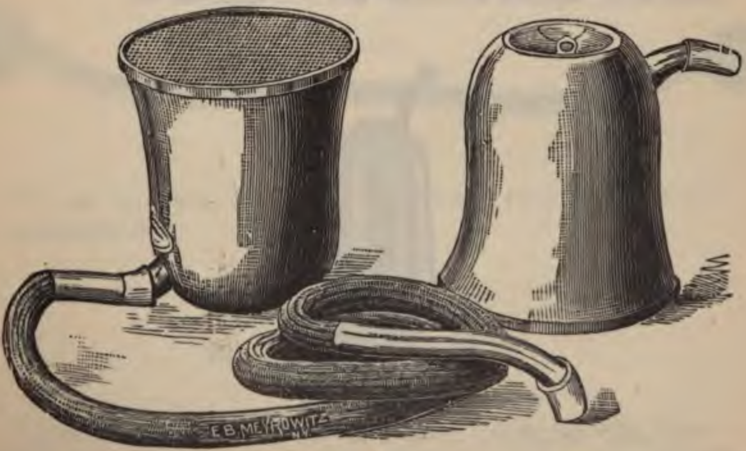
The ear-phone (Fig. 56) is one devised by Professor North. With this instrument the patient can hear voices at a distance, such as lectures, etc. This can be used either with or without the extension tube.

Fig. 55.


MEYROWITZ, N. Y.

Conversation Tube.

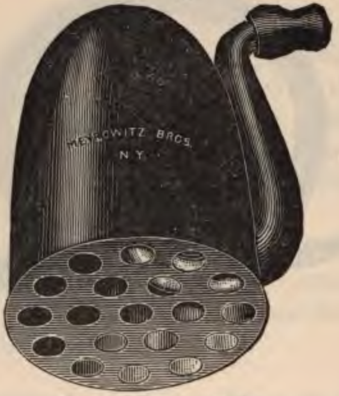
Fig. 56.



Ear-phone

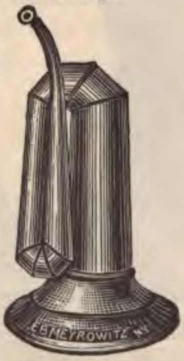
The London hearing dome (Fig. 57) is made in four sizes, of metal used in the manufacture of musical instruments, possessing superior acoustic properties. The dome is applied to the ear with the open end directed to the sound. This instrument possesses many superior advantages and is in universal use.

Fig. 57.



London Hearing Dome.

Fig. 58.

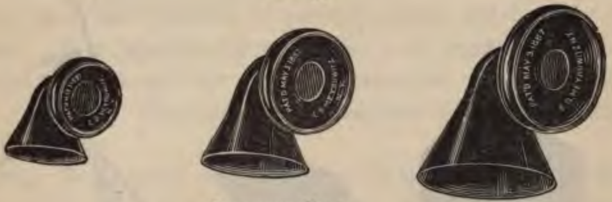

E.B. MEYROWITZ N.Y.

Ear Trumpets.

Ear trumpets are of much cheaper material, bunglesome and *onspicuous (Fig. 58).*

The otophone No. 1 (Fig. 59) is of polished black rubber, light and convenient, being easily carried in the pocket. This instrument is placed against the ear and is not inserted. The wave sounds do not strike direct against the drum head, but are interrupted by means of a diaphragm, as in the telephone receiver. The sounds are clearer and more distinct.

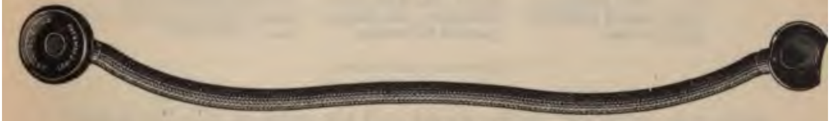
Fig. 59.



Otophone No. 1.

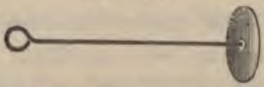
The otophone No. 2 is constructed merely for conversation. It is as shown in the illustration and consists in a mouth piece, tube and transmitter. This is very effective (Fig. 60) in those profoundly deaf.

Fig. 60.



Otophone No. 2.

Fig. 61.



Artificial Ear-drum.

Artificial ear-drums consist of a thin, soft-rubber disk, with gold or metal stem. They are adjustable to the exposed malleus.

They possess more or less efficiency. Sometimes a small pledget of cotton against the malleus will enhance wave sound.

The audiphone is a fan-shaped disk of vulcanized rubber (Fig. 62). In many cases it is of great value. The convex surface is presented to the sound and the edge of the fan is held to the teeth. It is recommended in sclerosis, etc.

FIG. 62.

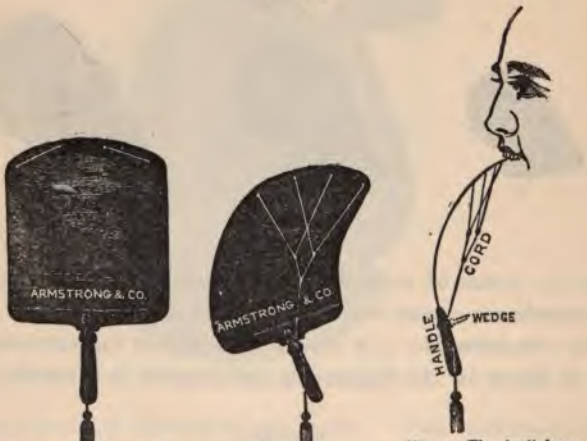


Fig. 1. The Audiphone in its natural position; used as a fan.

Fig. 2. The Audiphone in tension; the proper position for hearing.

Fig. 3. The Audiphone properly adjusted to the upper teeth; ready for use. (Side view.)

AMERICAN AUDIPHONE.

MECHANICAL TESTS OF HEARING AND THEIR APPLICATION.

Loss of hearing in the majority of cases is the direct cause of the aural surgeon having been consulted. To arrive at an accurate qualitative and quantitative test, many methods are devised. For making a complete test in addition to the Hartmann set of tuning forks, the Bezold-Edleman set of forks and whistles with a range of vibrations from 16 to 48,000 vibrations, the normal range of hearing for individuals under fifty years of age, is the best.

Whisper Test.

Unless the examiner, making use of this method, exercises great care in the choice of words, letters, numerals, pitch of voice, room and position of patient, results will be very inaccurate. It is best for the examiner, from repeated tests upon normal ears, to establish a fixed distance for recording tests of this character. Variations in this position will be eagerly watched by the patient.

Oscar Wolf, many years ago, gave to the world his investigations of the voice as a test of hearing. The letter R is taken as the lowest in the scale, having 128 vibrations per second, and the letter S as the highest number of vibrations, having 5,400–10,840 vibrations per second. "Thus may be tested from the lower to two octaves of the higher musical tones." Thus in disease of the middle ear or external auditory canal, those letters of low number of vibrations will be lost, while in labyrinthian disease low vibrations will be heard and high vibrations lost. The voice test should be used only with residual air.

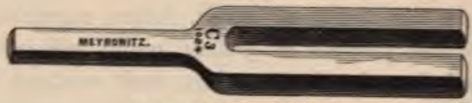
The Watch Test.

Like the voice, this test is subject to inaccuracy. The ordinary watch is heard from thirty to forty inches. As in the voice and tuning fork it must be remembered that those of high pitch are best heard when there is middle ear disease and low pitch when there are labyrinthian complications. Two watches are used: one with high-pitched ticker and the other with low-pitched ticker.

In recording this test, the normal distance is taken as the denominator and the distance at which the watch is actually heard as the numerator. Thus if heard at 15 inches, the record should read watch 15/40, if upon contact only watch C/40.

The Hartmann set of five tuning forks (Fig. 63), varying in size from 125 to 2,048 vibrations per second, are more often used in making the Weber and Rinne tests.

FIG. 63.



HARTMANN TUNING FORK.

The ends of the fork should be provided with movable clamps to prevent overtones and to govern pitch of instrument.

By the Weber test, the tuning fork, preferably the 256 V, is placed in the median line of the skull. If there is disease of one or both ears, involving the Eustachian tube, the middle ear, or stoppage of the external auditory canal, the tuning fork will be heard loudest on the diseased side; if one side only is diseased, vibrations will alone be heard on that side. If the vibrations are heard only on the side of the good ear, disease of the labyrinth is indicated. Where we have diseases of both the middle ear and labyrinth we have two opposing conditions. The test is not so reliable in bilateral as in unilateral deafness.

By the classical Rinne test, introduced by Rinne of Prague in 1855 we discovered the relative hearing power by bone and air conduction. In the normal ear the vibrations through the air are heard from fifteen to twenty seconds longer than through the mastoid. In the use of this test the position of the tuning fork 256 V upon the mastoid and movements to the auditory canal must be considered, likewise the age of the patient, remembering in those over sixty, bone-conduction is slightly diminished.

This test is of such practical importance and so little understood by the student that an effort will be made to simplify it, stating the proposition so that it may be practically applied. For a clear understanding the student should take up in detail *the analysis of the test,* impossible in a work of this character.

This test is performed by placing the fork upon the mastoid, noting the length of time vibrations are heard and then quickly transferring before the ear and noting the revival of vibrations and length of time. If the vibrations last for fifteen to twenty seconds, we register "Rinne normal." If, say five seconds, we register "Rinne + (positive) 5." If the vibrations are not heard through the air we register "Rinne — (negative)."

Advisedly speaking, diagnostic signs of this character are not infallible. By this knowledge and conductive reasoning we arrive at a clear understanding of the character of the disease.

The following proposition is a modification of that set forth by Dundas Grant and will possibly give the student a clear conception of the application and value of the test. It is to be remembered that the Rinne test gives more accurate knowledge of the sound-conducting apparatus than the perceiving apparatus.

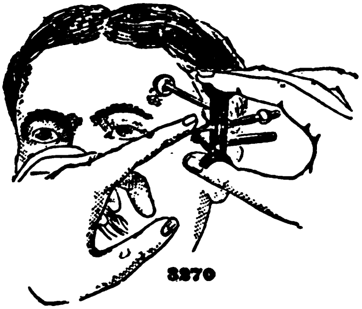
A C = Air conduction.
B C = Bone conduction.
A O D = Aëro-osseal difference, or 20″ (20 seconds).
N A O D = Normal aëro-osseal difference.
A C = B C + 20″.
N A O D = 20″. Rinne positive, *i. e.*, conducting apparatus normal.
N A O D — 10″ = Rinne positive, but shortened, conductive apparatus is one half affected.
N A O D — 20″ = 0. Rinne negative, the conductive apparatus considerably affected.
N A O D — B C = Disease of the perceiving apparatus.
N A O D — (B C + 10″) = Partial disease of perceiving apparatus.
N A O D — (B C + 10″) — (A C + 10″) = Disease of perceiving apparatus.

"A combination of conditions, as remarked by Grant, as exemplified in the latter stages of dry catarrh of the middle ear when the labyrinth becomes involved and also in tuberculous disease of the middle ear, extending to the labyrinth."

The Acoumeter

was devised by Politzer (Fig. 64) for examining the relative hearing distance. It is an instrument tuned to a certain pitch with no variations in intensity. It is supposed to be heard at

FIG. 64.



forty feet, which number is taken as the denominator in recording the test.

The Schwabach Test.

This test is made by ascertaining the number of seconds the fork is heard upon the mastoid and through the air and comparing with the normal register of the fork. Thus an increase of bone conduction over the normal would indicate disease of the conducting apparatus, below the normal disease of the perceiving apparatus. When both air and bone conduction is below the normal, there is probable disease of both middle ear and labyrinth.

The Gelle Test.

In this test the air in the external auditory canal is compressed and the fork placed upon the vertex.

In the normal ear the vibrations are diminished. If there is ankylosis of the foot plate, according to Gelle, there will be no change in vibr [illegible] byrinthian disease is present, there is n [illegible] ns with each compression.

Bing Test.

No. 1. — (From Ballenger on the "Functional Tests of Hearing.") This test is also used to differentiate between middle ear and labyrinthian affection. This experiment is based upon the fact that when the tuning fork upon the mastoid ceases to be heard it is heard anew when the external meatus is closed with the finger. In cases with pronounced deafness, if closing the meatus does not develop the tone anew it is, according to Bing, a sign of middle ear disease, whereas if it is heard again (in cases of pronounced deafness) it is a sign of labyrinthian disease. This test seems of value only in very severe deafness.

No. 2. — This test is thus referred to for the sake of convenience of reference, and refers to what Bing calls the "entotic" use of the speaking tube. The purpose of the test is to differentiate between ankylosis of the foot plate of the stapes and adhesive bands, or other pathological conditions which hinder the malleus and incus in transmitting sound waves. The test is made by comparing the hearing of a patient through the speaking tube applied to the Eustachian tube by means of a suitable attachment fitting into the Eustachian catheter. If the patient hears better through the speaking tube by way of the catheter than he does through the external meatus, the inference is that the foot plate is freely movable while the malleus and incus are fixed or hindered in their vibrations. If such is the case, a rational sort of treatment is at once suggested, *i. e.*, either the freeing of the malleus and incus from the adhesions or other hindrances or removing one or both, perhaps preferably only the incus. The sound waves might then reach the foot plate through the vibration of the air in the tympanic cavity and hearing be materially improved.

The Galton Whistle.

With this instrument, which acts as a closed organ pipe, the vibrations from 16 to 40,000 per second are produced. With it relative tests for high and low tones are registered.

König's Rods.

Consists of a series of small steel cylinders of various length. With this method the upper tone limit is more accurately determined.

MECHANICAL THERAPY.

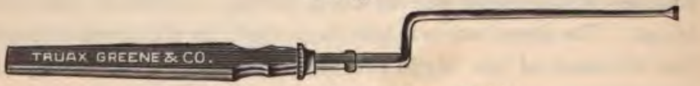
Massage of the Tympanum.

To determine the mobility of the ossicles, which will in many cases govern prognosis, it is necessary to employ a massage otoscope, for by no other method can we observe the amount of mobility of the drum.

"Massage treatment is essential where we have connective tissue deposit within the middle ear, producing complete or partial ankylosis of the ossicles, contraction of the tympanum and mucous lining of the intra-tympanic cavity, anesthesia of the tensor tympani muscles."

In the use of massage instruments we must guard against too much force, which might produce unnatural vibrations of the tympanum, and cause severe hyperemia and subsequent inflammation. Massage should be administered two or three times a week, for six or eight weeks, with the knowledge that prolonged manipulation often results in atrophy of the drum-head and permanent disability. In the careful manipulation and continued use of massage, flattering results are reported in the treatment of chronic catarrhal otitis media.

Fig. 65.



Lucae's Pressure Probe. (Latest Model.)

The vibrations produced by holding a telephone receiver firmly against the ear and having the reduced current generated from the central station or battery will likewise stimulate the tympanum. Lucae's pressure probe (Fig. 65) is now and then indicated when there is no response on the ossicular chain from the use of the otoscope.

Conspicuous redness along the malleal plexus of the vessels or membrana flaccida should contraindicate the treatment.

Massage of Upper Air Passages.

As a therapeutical measure in treatment of upper air passages massage has not met with as favorable use in this country as in Europe. Dr. Braun (Trieste) in 1891 first advocated vibratory massage of the upper air passages and demonstrated his method before the International Medical Congress at Berlin. In the words of the author:

"I employ two principal forms of movement in massage of the mucous membrane of the nose, naso-pharynx, pharynx, larynx, and upper part of the trachea: They are stroking and vibration, and the two are combined in such a way that each part of the mucous membrane is thoroughly stroked and massaged. Copper probes of three sizes, with olive points to correspond to the parts to be treated, as the Eustachian tube, naso-pharynx, pharynx, larynx and trachea. To manipulate the probe it is held as a pen; four hundred vibrations are thus given per minute; hand manipulation being too slow, an electric vibrator giving two thousand vibrations per minute may be used. The point of the probe is carefully wrapped with cotton saturated with the remedy indicated, and carefully applied to the whole mucous membrane."

Dr. Dionisi (Turin), Journal of Rhinology and Otology, Vol. VIII., 1894, described a bag made of India rubber to be introduced into the nasal cavity and blown up with air, which causes it to come in contact with all the parts. The bag is connected with a vibrator by the tube. The vibrator consists of a chamber of air, vibration being transmitted by means of a piston.

Action of Massage Upon the Mucous Membranes of the Nose and Throat.

As in other parts of the body massage produces a greater physiological activity of the parts. Braun remarks "That the diminished sensibilities produced by massaging give to the mucous membranes a greater resistance against agents which act upon it harmfully." He recommends the following:

℞ Menthol,
Vasolin, 10 per cent.

℞ Balsam peru,
Vasolin, 10 per cent.

℞ Sol. hydrarg., 1–1000
Alcoholis,
Lanolini,
Iodo-glycerini, } āā 10 per cent.

Massage is contraindicated in acute inflammatory conditions and indicated in all chronic inflammation of the nose, throat and Eustachian tube, as hay-fever, nasal asthma, trigeminal neuralgia, atrophic nasal catarrh, ozena, etc.

MASSAGE OF THROAT EXTERNALLY.

This form of therapy is unfortunately not generally used. It is useful in chronic pharyngitis, chronic tonsillitis, chronic laryngitis and laryngeal paralysis. Unless applied systematically little good may result. It should be administered daily until requirements are met. Stroking is the form of massage indicated in the cervical region. The patient sits with the head slightly thrown backward, the operator stands facing the patient as in the Gerst method. If the patient sits the operator stands behind. The strokes are downward and outward, with a moderate degree of pressure. In children the patient is laid upon the lap of the operator and nurse, operator facing the child. With head slightly *thrown* back the neck is grasped with the fingers on the vertebræ and the thumbs to the larynx ; the downward strokes are made with the thumbs.

THERMIC AGENTS.

Heat and cold are two terms well known to the profession and to the laity, yet their rational application is not always based upon sound philosophy or experience.

"The application of extreme degrees of heat and cold is practically identical, and consists in the destruction of tissue, so that freezing and burning may produce somewhat similar appearances of the tissues and cause like symptoms. Slightly lower degrees of heat still act much like extreme cold, tending to coagulate albumin, to stimulate involuntary muscles, to contract blood-vessels and thus check bleeding, to lower the action and vitality of tissues and microörganisms, and to retard metabolism" (Friedenberg). The reaction is in direct ratio to the intensity of the heat and cold.

COLD APPLICATIONS.

Cold applications may be subdivided into dry and moist cold, and when applied cause contraction of the blood-vessels, lowering of temperature, preventing or altering the exudation of inflammatory products, thus acting as a slight antiseptic and anodyne. Care should be taken that the cold applications are not continued for too long a time, for fear of causing necrosis, or increased irritation.

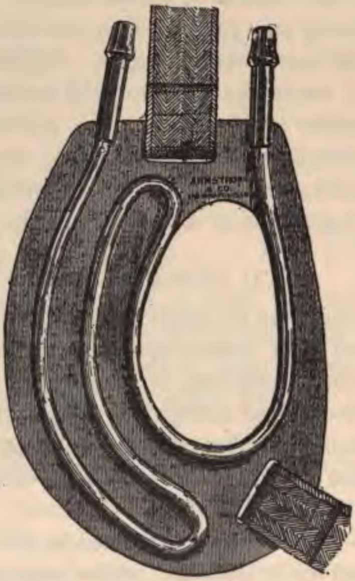
Dry Cold. — Dry cold is best applied to the ear or throat by means of cracked ice in bladders, rubber bags or passed through the Leiter tube (Fig. 66), which is more often used than any other method. This is especially indicated in mastoid inflammation, in that the tube can be molded to fit the parts. In acute inflammation of the mastoid it should not be used to exceed forty-eight hours. In the absence of a Leiter tube, resort may be had to ice bags.

Moist Cold.

Moist cold is applied by dipping soft towels into iced solutions, and then applying them direct to the nose, throat or ear, or by irrigation. The application of moist cold being disagreeable both to the patient and the nurse, the dry cold is recommended.

In certain chronic inflammations of the throat sudden application of cold water to the throat externally acts as a stimulant. In patients predisposed to catarrhal troubles during cold and damp weather, this method will, in a great many cases, have a beneficial effect in preventing such troubles, if used with regularity upon rising. This is recommended in children as well as in adults.

FIG. 66.



In acute inflammation of the throat, in the very beginning of the trouble, ice packs externally, and Dobell's solution (iced) or cracked ice in the mouth is indicated. The ice bags ordinarily should not be applied for more than a half hour at a time. They *may however* be repeated at short intervals.

Warm Applications.

The application of heat may be subdivided into two forms, dry and moist.

Dry heat is more pleasing to the patient than moist because it is more constant, easy of application and soothing in effect. In the application of moist and dry heat the surgeon must be governed by the conditions of the case. Dry heat may be applied by hot water bags, hot sand, or salt bags, hot water bottle, constant temperature of water through tubes, and hot flannels. Heat, when applied dry, has the faculty of increasing circulation and thus facilitating and encouraging the absorption of inflammatory products, as in acute inflammation of the middle ear, lessening the tension, and anesthesia of irritated and painful nerve terminals.

Moist Heat

Is best applied to the ear or throat and covered with rubber or thick cloth to prevent evaporation.

Heat in this form stimulates the localization of pus. One disadvantage experienced in its application is the inconstancy of temperature.

Poultices

Are now, as of old, a universal method of applying moist heat to the surface. Certain unguenta, such as antiphlogistin, etc., are recommended in the form of poultices to the throat and mastoid. They should be thoroughly heated before applying. The heat may be best maintained by the addition of a hot water bottle to the poultice. The hydroscopic effect of the glycerin is evidently the potent factor of such poultices. Others are ground flax-seed, ground barley from breweries, bread crumbs moistened with milk, and fat meat so often used in country districts. It is essential that poultices be covered with oiled silk or greased paper that the even temperature may be more easily retained.

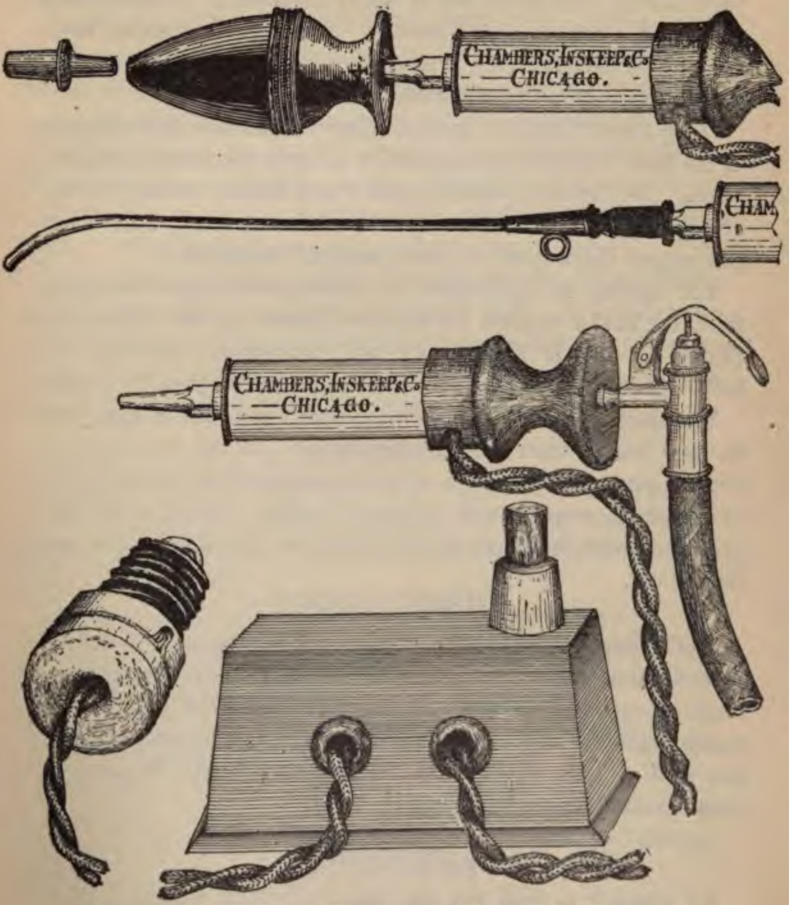
HOT AIR.

The following, relative to the application of hot air in the treatment of diseases of the ear, nose and throat, is copied from the summary proceedings of the International Medical Congress, August 5, 1900, and reported to the Laryngoscope, January, 1901, being a report of the research of M. Lermoyez and G. Mahu of Paris.

"Hot air has not up to the present been utilized in the treatment of diseases of the upper air passages except in the form of inhalations, a coarse method which causes moist air whose temperature is hardly above that of the surrounding air to circulate in the nasal fossæ. We propose to apply to circumscribed areas of the mucous membranes currents of dry air superheated to a temperature of 80° to 100°, a method which recalls those employed by Hollander and Jayle in dermatology and gynecology. The supply of air under pressure is furnished by steel tubes containing the air under pressure of 120 atmospheres, the latter is heated in a metallic worm, and is conducted to its destination by supple metallic tubes, with a double coating of asbestos. At the end of this tube are screwed canulæ of various size and shape, according as it is desired to apply hot air to the turbinates, at the Eustachian openings, or in the ear. At the base of the canulæ there is attached a regulator of the temperature and pressure.

"Applications of hot air are made under the control of the vision, with a head mirror and speculum; sitting lasts two minutes, and is repeated two or three times a week. As a rule from eight to ten sittings are necessary to obtain a good result. This treatment is perfectly painless. The entrance of the hot air brings about an intense retraction of the mucous membrane which is soon followed by abundant watery offensive secretions which cease in a few moments. The value and effect produced by this treatment shows itself next; at first temporary, it tends to become *permanent.* Applications of hot air have especially succeeded with us in cases of chronic congested coryza, with intermittent nasal obstruction. It gives results remarkable as well as lasting,

FIGS. 67 AND 68.



SEELEY'S HEATER CATHETER AND PYNCHON'S INFLATER.

provided there is not yet angiomatous degeneration of the nasal mucous membrane. They rapidly suppress the sneezing a other nervous symptoms of spasmodic coryza. They dry the flow of nasal hydrorrhea and bring back the nasal mucosa to its normal objective state. In hay-fever, in which our experience is still more recent, they seem only to relieve the attack. Finally, they give good results in aural troubles, deafness and tinnitus, associated with catarrh of the nose and naso-pharynx; otolgia gives way to them almost immediately.

"An attempt to make this treatment the panacea of all diseases of the nose would be to condemn it to rapid loss of all consideration. We believe it useful to state that it has, up to the present, given no results in ozena, purulent catarrh, nasal and naso-pharyngeal diseases which justify surgical treatment."

For making an application of heated air to the Eustachian tube, the heater devised by Seeley as shown in the illustration (Figs. 67–68) is inexpensive and thoroughly practical. A hard-rubber catheter and Pynchon's inflator complete the outfit.

The hard-rubber catheter being a poor conductor of heat, can be used longer than one of solid metal. In the Pynchon inflator is placed a small piece of sponge saturated with equal parts of menthol, camphor and tincture of iodin. The hot air impregnated with the fumes is forced into the Eustachian tube and middle ear.

CHEMIC AGENTS.

Under this subject will be considered, for the sake of convenience, those therapeutical agents or their media which have local, alterative, tonic and sedative effect upon the system. In many respects some great irregularity will, to the reader, manifest itself. In a work of this character a certain freedom of classification is essential to brevity.

ANTISEPTICS.

To attempt to treat the ear, nose and throat without a thorough knowledge of antisepsis is to invite absolute failure. Lister's discovery gave to the medical profession the key-note of *surgical success.*

The same thorough rules of aseptic and antiseptic methods herein apply as in general surgery. A great many drugs, not classed as antiseptics, possess more or less bactericidal power when combined with the secretions of the nose and throat.

Among those frequently used are carbolic acid, 1:20 or 1:40, carbolic acid pure, afterwards being neutralized by alcohol, bichlorid of mercury 1–1000 to 1–5000, iodoform, aristol, alcohol 1–10, potassium permanganate 1–200, protargol, Lister's antiseptic solution, hydrogen peroxid, camphoroxol, menthoxol, campho-phenique, argentum nitrate, formaldehyd 1–1000 to 1–2000, formalin 1–5000, boracic acid, chlorid of zinc, methyl-violet 1–1000, thymol, creasote and acetozone 1–1000.

As an antiseptic, heat in the form of incandescence, boiling water, steam or hot air is now universally used. A temperature of 140° F. for ten minutes being fatal to all pathogenic bacteria, except the tubercle bacillus and anthrax, which requires a moist heat of 212° F. for four minutes (Sternberg).

Disinfection.

After an accurate diagnosis, either by aid of the microscope or local and general signs, many diseases demand isolation and disinfection, not alone to lessen the virulence of the disease, but to prevent its spread.

The method of burning sulphur for disinfection dates far back in history and at the present time is very universally used. This should be supplemented by liquid antiseptics as cleansing fluids to all surfaces, windows, floors, doors, etc.

Those articles of clothing and bedding which cannot be disinfected by boiling should be incinerated.

Formaldehyd gas has the faculty of penetrating upholstering, clothing, blankets, etc., without injuring. Formaldehyd generators are now cheap and thoroughly efficient.

Disinfection of the Field of Operation.

To bring about asepsis the field of operation must be disinfected by means of chemical measures. If to the mastoid, the hair is carefully shaved from the parts the night previous to the operation, if possible, scrubbed with soap and water, then with pure alcohol and covered with moist lint previously dipped in solution of bichlorid of mercury, 1–1,000. Even with the above precautions it is difficult to secure an aseptic field, for the reason that certain bacteria have the faculty of dipping down into the epithelium, beyond the reach of antiseptics.[1]

Preceding nose and throat operations, the nose and throat are carefully cleansed of all accumulations with spray of warm alkaline fluids followed by a solution of mercury bichlorid 1–5,000. In tonsillar operation the application of solution of carbolic acid ten per cent. will have the double effect of acting as an anesthetic and antiseptic. In those old enough to follow instructions, the frequent use of antiseptic gargles and mouth washes should be advised a few days before the operation upon the nose or throat. The teeth should be carefully looked after, and as old cavities harbor organisms, old stumps should be removed.

The ear, providing the operation is through the auditory canal, is carefully washed with warm water, dried with alcohol, or irrigated with hot solution bichlorid of mercury 1–5,000.

Disinfection of Instruments.

Instruments can be most successfully sterilized by boiling them in one per cent. solution of sodium bicarbonate for a period of from five to ten minutes. Too prolonged boiling acts injuriously upon instruments. If small instruments, they are afterwards laid in hard rubber, glass or porcelain trays containing ten per cent. solution carbolic acid, or pure alcohol. Before using they may be carefully dried with sterilized gauze. The large instruments, such as saws, tonsillotome, etc., may be wrapped in sterilized towels to await cooling, and time of operation. Every office should be provided with some apparatus for sterilization. The simplest are often as effective as the most complicated ones.

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[1] *Bacillus of* Welsh.

Oxycyanid of mercury used in the strength of 1–500 has been recently used for the sterilization of instruments. It does not corrode as the bichloride. A great many operators in this country and Europe have small heaters for boiling water conveniently placed upon the operating table, for the immersion of instruments during and after treatment of each patient.

Disinfection of Hands.—The hands should first be scrubbed with green soap and hot water, then soaked for a few minutes in a saturated solution of potassium permanganate, next in a saturated solution of oxalic acid until the stain is entirely removed. They should then be washed in sterilized water and lastly immersed in a solution of corrosive sublimate 1–1,000 for two minutes.

Bandages.

There is necessarily a limited field for the use of bandages. Those which may be used must be sterilized with steam at 212° F. Sterilized gauze bandages prepared by Johnson and Johnson are in universal use in hospitals and in the U. S. Army.

Gauze.

It is impossible to perform many operations upon the nose without the liberal use of gauze for packing the cavity. Carefully prepared gauzes are known as sublimated, carbolized or iodoform. Here we are essentially dependent upon the reputable manufacturer. Small amounts of gauze preserved in dark bottles, to protect from the light, appeal to the majority of operators.

Cotton.

In the daily treatment of cases it is almost impossible to use sterile cotton. In operations it is very essential that sterilized cotton be used for freeing from blood, etc. As a dressing or packing it is unsatisfactory, for many reasons.

ASTRINGENTS.

Astringents are drugs which produce contraction of organic tissue and exert an influence upon the arrest of morbid discharge due to relaxation of the tissues. They are subdivided into mineral and vegetable. Very often it is advantageous to combine the mineral and vegetable salts. By the injudicious use of either it is easy to defeat the object for which they are intended, producing a dilatation rather than a contraction of blood-vessels.

The Vegetable Astringents

Are usually applied in full strength to check hemorrhage, as mild local astringent may be prescribed in the form of a spray, tablets, pastilles, lozenges or suppositories. Among the vegetable astringents are especially tannic and gallic acid. Formulæ frequently used are :

℞	Ac. tannici,	2.75 gm. (gr. xl)
	Ac. gallici,	1.30 gm. (gr. xx)
	Sodii bicarb.,	15.00 gm. (ʒ ss)

To be dissolved in an ounce of water and used as a spray or gargle.

℞	Morphinæ sulph.,	0.26 gm. (gr. iv)
	Ac. tannici,	1.95 gm. (ʒ ss)
	Menthol,	.06 gm. (gr. j)
	Petrolati spissi,	15.00 gm. (℥ ss)

For unguentum to nostrils.

℞	Ac. tannici,	0.30 gm. (gr. v)
	Iodoformi,	0.12 gm. (gr. ij)
	Acaciæ mucilago,	0.12 gm. (gr. ij)

For powder.

℞	Ac. tannici,	3.90 gm. (ʒ j)
	Glycerini,	4.00 c.c. (ʒ j)
	Alcohol,	30.00 c.c. (℥ j)
	Aq. mentholis,	q.s. 60.00 c.c. (℥ ij)

For gargle.

℞	Iodi,	15.00 gm. (℥ ss)
	Ac. tannici,	15.00 gm. (℥ ss)
	Aquæ,	240.00 c.c. (℥viij)

Evaporate to	60.00 c.c.	(℥ij) and add
Glycerini,	120.00 c.c.	(℥ iv)
Ac. carbolici,	.12 gm.	(gtt. ij)

In chronic rhinitis. (Sajous)

THE MINERAL ASTRINGENTS.

Probably among the mineral astringents the nitrate of silver is more often indicated.

Protargol in varied solutions has recently come into general favor. It is a silver albumose containing eight per cent. of metallic salt. It was first discovered by Chemist Eichengrum and introduced as a therapeutic agent by Benario. It differs from the nitrate of silver in that the nitrate is dependent upon its power to precipitate albumin from the epithelial layer with which it may come in contact. In this way the epithelium is detached and with the contained bacteria is destroyed (Hirschberg). While protargol does not precipitate albumin it penetrates deeper into the cellular tissue, thus acting as a deep astringent, antiseptic and bactericide without irritating properties.

Argyrol in a strength varying from 5 to 50 per cent., is equally as efficacious as protargol and less irritating.

In acute and chronic catarrhal conditions of the nose and throat the following solutions are universally used:

℞	Argenti nitratis,	.12 gm.	(gr. ij)
	Aquæ destillæ,	30.00 c.c.	(℥j)
℞	Argenti nitratis,	.24 gm.	(gr. iv)
	Aquæ destillæ,	30.00 c.c.	(℥ j)
℞	Argenti nitratis,	1.4 gm.	(gr. xx)
	Aquæ destillæ,	30.00 c.c.	(℥ j)
℞	Protargol,		2%
℞	Protargol,		5%
℞	Protargol,		8%
℞	Protargol,		20%
℞	Protargol,		50%
℞	Argyrol,		5%

℞	Argyrol,	25%
℞	Argyrol,	50%

So far there is great discrepancy in regard to the real practical application of protargol and argyrol in nose and throat therapy. As a rule the stronger solutions are well borne in the throat in chronic conditions. In purulent inflammation of the middle ear with perforation, on account of the germicidal action, solutions of five per cent. of protargol or ten per cent. of argyrol are well borne, and are of great value. In acute rhinitis a two per cent. solution of either sprayed into the nose often produces a beneficial effect.

Argonin, like protargol, or argyrol is a compound of silver salt, a white powder non-irritating, soluble in hot water. It is a powerful bactericide in solutions of 1–1,000 and 1–5,000. It is especially indicated in flushing the middle ear in acute and chronic otitis media purulenta. Drs. Gray and Thompson recommend it in two to five per cent. solutions to stimulate closure of perforation of tympanic membrane.

Among other astringents to be mentioned are: chlorid of zinc, sulphate of zinc, oxid of zinc, iodid of zinc, alum, alumina, bicarbonate of sodium, biborate of sodium, sulphate of sodium, and sulphate of copper. Many combinations of the above are now on the market, classed as newer remedies, such as borol, boricin, etc., possessing more or less value as astringents, practically, however, adding no great advance to the therapy of the diseases under consideration.

Olea-stearate of zinc, which is prepared by precipitating stearates of zinc in benzoinated liquid albolene, is especially efficacious in the dry treatment of affections of the ear, as in eczema, as a sedative astringent to the mucous membrane of the nose, nasopharynx, pharynx and larynx clinging for a long time to the surface. The following combinations are on the market: Olea-stearate of zinc, plain; olea-stearate of zinc, with balsam peru; olea-stearate of zinc, with liquor plumbi subacetate; olea-stearate of zinc, with boric or carbolic acid; olea-stearate of zinc, with iodin; olea-stearate of zinc, with ortho-chlorol-phenol. Olea-stearate of zinc, with camphor and menthol; olea-stearate of zinc, with acetanilid; olea-stearate of zinc, with oil pinus pumilio and eucalyptol; olea-stearate of zinc, with oil pinus pumilio; olea-stearate of zinc, with antipyrin.

The four forms of mercury more commonly in use are calomel, bichlorid, oxcyanid, and yellow oxide. The first is more especially used as a purgative, as a topical dressing in ulceration of the septum, and eczema of the external ear.

Bichlorid of mercury, or corrosive mercuric chlorid, as an antiseptic and antiparasitic, since 1870 has been recognized as the fin-de-siècle of all germicides.

Possessing caustic properties, we are limited to very weak solutions; 1–5,000 is more often used, 1–2,000 is very irritating and painful, 1–10,000 is devoid of any painful reaction and may be continued indefinitely without ill results.

Yellow oxid of mercury is used in the form of ointment in two, four, six or eight grains to the ounce of benzoate of lard or lanolin, and is a mild astringent and stimulant.

ALKALINE SOLUTIONS.

Very often for cleansing the nose, naso-pharynx and pharynx, solutions; as indicated are in vogue. Glycero-thymol and Dobell's solution are non-irritating, Seiler's solution after prolonged using is irritating to the mucous membrane of the nose and pharynx.

Much of the virtue of Dobell's solution as a cleansing and soothing application depends upon the compounding. That recommended by Pynchon is more satisfactory to the author than any used in ten years of observation in nose and throat work.

℞	Sodii bicarb., Merck, C. P.,	
	Sodii bibor., Squibb,	āā 60.00 gm. (℥ ij)
	Sol. antiseptici (Lister),	240.00 c.c. (℥ viij)
	Glycerini, C. P.	750.00 c.c. (℥ xxiv)

"First mix and triturate the two salts and place them in a onegallon bottle, adding one half the quantity of glycerin; then let the mixture stand twenty-four hours uncorked, with frequent agitations. Then add the remainder of the glycerin, and continue agitations for another twenty-four hours with the bottle uncorked as before. Lastly, add the Lister's antiseptic solution and let stand twenty-four hours longer, when it is ready for use. By the admixture of the glycerin with the salts the foaming is produced which means a liberation of carbonic acid gases and the production of glycerol. In its use it is designated that each ounce of the mixture shall be diluted with water one pint, which will then contain thirty grains each of borax and soda, two drachms of Listerine and of glycerin six drachms, making a bland and pleasant solution with a specific gravity of 1015. For office use it is the standard alkaline spray used by the author, though for use as a spray he is particular to dilute with distilled water" (Pynchon).

ASTRINGENT SPRAYS.

Among the solutions frequently used for sprays and local applications are the following:

℞	Glycerol tannin,		4.00 c.c.	(ʒ j)
	Aquæ,	ad	30.00 c.c.	(℥ j)

℞	Argenti nitratis,		.18 gm.	(gr. iij)
	Aquæ,	ad	30.00 c.c.	(℥ j)

℞	Alumenis,		.60 gm.	(gr. x)
	Aquæ,	ad	30.00 c.c.	(℥ j)

To be used in chronic and purulent rhinitis.

℞	Zinci sulph.,	.18 gm.	(gr. iij)
	Glycerini,	2.00 c.c.	(ʒ ss)
	Aquæ,	30.00 c.c.	(℥ j)

In chronic hypertrophic rhinitis.

℞	Ac. tannici,		1.5 gm.	(gr. xxiv)
	Glycerini,		3.0 c.c.	(gr. xlviij)
	Aquæ,	ad	30.00 c.c.	(℥ j)

In naso-pharyngeal catarrh.

℞	Zinci sulph.,	1.00 gm. (gr. xv)
	Aquæ,	30.00 c.c. (℥ j)

In laryngeal and pharyngeal affections.

℞	Tinct. iodi comp.,	4.00 c.c. (ʒ j)
	Ac. carbolici (cryst.),	1.16 gm. (gr. xviij)
	Glycerini,	75.00 c.c. (℥ ijss)
	Aq. dest.,	30.00 c.c. (℥ j)

Mix. Place in a water bath of 100° in tightly corked bottle until colorless. Filter. May be used as a spray or by means of the cotton-tipped applicator (Boulton).

Bland Medication.

By this is meant the application of some light oil, more especially albolene, with one or more chemicals in solution. This is applied to the mucous membrane of the nose, throat and ear by means of a spray or nebulizer. Where the nose is denuded of its natural protecting fluids by irrigation or spray, a bland oil is necessary for the protection of the mucous membrane against irritation.

Solution of camphor-menthol in lanolin one per cent.
" " " " " " two " "
" " " " " " three " "
" " " " " " ten " "

℞	Thymol,	.12 gm. (gr. ij)
	Menthol,	.12 gm. (gr. ij)
	Albolene,	30.00 c.c. (℥ j)

In acute pharyngitis. (Brown.)

℞	Menthol,	.6 gm. (gr. ix)
	Albolene,	60.00 c.c. (℥ ij)

In chronic pharyngitis. (Brown.)

℞	Menthol,	.35 gm. (gr. v)
	Ol. caryoph.,	.67 c.c. (gr. x)
	Albolene,	30.00 c.c. (℥ j)

(Brown.)

℞	Thymol,	.06 gm.	(gr. j)
	Menthol,	.35 gm.	(gr. v)
	Ol. anisi,	8.00 c.c.	(ʒ ij)
	Albolene,	30.00 c.c.	(℥ j)

In chronic pharyngitis. (Brown.)

℞	Ol. menth. pip.,	4.65 c.c.	(ʒ j¼)
	Albolene,	30.00 c.c.	(℥ j)

In naso-pharyngeal catarrh.

℞	Thymol,	0.65 gm.	(gr. x)
	Menthol,	1.30 gm.	(gr. xx)
	Eucalyptol,	1.30 c.c.	(gtt. xx)
	Ol. cubebæ,	2.50 c.c.	(gtt. xl)
	Benzoinol,	178.00 c.c.	(℥ vj)

For general use after alkaline spray.

℞	Creasoti,	4.00 c.c.	(ʒ j)
	Ol. picis liquidæ,	1.25 c.c.	(gtt. xx)
	Albolene,	15.00 c.c.	(℥ ss)

In laryngeal tuberculosis.

℞	Camphoræ,	.06 gm.	(gr. j)
	Menthol,	.24 gm.	(gr. iv)
	Ol. santali,	.30 c.c.	(gtt. v)
	Albolene,	30.00 c.c.	(℥ j)

In rheumatic pharyngitis.

℞	Ol. gaultheriæ,		(gtt. ij)
	Camphor-menthol,		(gtt. ij)
	Ol. eucalypti,	āā .12 c.c.	(gtt. ij)
	Cocainæ hydrochloratis,	.13 gm.	(gr. ij)
	Benzoinol,	30.00 c.c.	(℥ j)

Use with spray for acute laryngitis, pharyngitis, coryza, etc.

℞	Resorcin,		(gr. j)
	Tinct. iodi,	āā .06 gm.	(gr. j)
	Camphor-menthol,	.12 gm.	(♏ ij)
	Ol. eucalypti,	.18 c.c.	(gtt. iij)
	Benzoinol,	30.00 c.c.	(℥ j)

Use in spray for chronic catarrh, adenoids, hypertrophy, etc.

Among formulas in common use with the (Globe) nebulizers are the following:

℞	Ol. eucalypti,	0.92 c.c.	(gtt. xv)
	Menthol,	0.32 gm.	(gr. v)
	Benzoinol,	30.00 c.c.	(℥ j)

Use with nebulizer for simple catarrh of the nose, throat and bronchial tubes, and after the first stage in all acute affections.

℞	Menthol,	0.46 gm.	(gr. vij)
	Camphor,	0.46 gm.	(gr. vij)
	Cocainæ muriatis,	.24 gm.	(gr. iv)
	Benzoinol,	30.00 c.c.	(℥ j)

Use with nebulizer for acute bronchitis, pneumonia, and all acute inflammatory affections of the air passages.

℞	Ol. caryophyli,	0.46 gm.	(gr. vij)
	Creasoti (beechwood),	0.97 gm.	(gr. xv)
	Ol. picis liq.,	0.97 gm.	(gr. xv)
	Iodi,	0.46 gm.	(gr. vij)
	Benzoinol,	30.00 c.c.	(℥ j)

Use with nebulizer for pulmonary and laryngeal tuberculosis, and in any condition requiring an active antiseptic.

℞	Ac. tannici,	0.46 gm.	(gr. vij)
	Iodi,	0.46 gm.	(gr. vij)
	Benzoinol,	30.00 c.c.	(℥ j)

Use with nebulizer for chronic catarrh of nose, throat and bronchial tubes, and in any case where an alterative and astringent is desired.

℞	Quininæ hydrobromatis,	1.95 gm.	(gr. xxx)
	Camphoræ monobromatis,	0.97 gm.	(gr. xv)
	Cocainæ muriatis,	0.46 gm.	(gr. vij)
	Antipyrini,	0.46 gm.	(gr. vij)
	Benzoinol,	30.00 c.c.	(℥ j)

Use with nebulizer for hay-fever, asthma, whooping cough, croup, and acute bronchial affections.

℞ Iodi,	0.32 gm. (gr. v)
Ac. carbolici,	0.32 gm. (gr. v)
Camphor-menthol,	0.97 gm. (gr. xv)
Ol. eucalyptis,	1.00 c.c. (gtt. xv)
Benzoinol,	30.00 c.c. (℥ j)

Use with nebulizer for middle ear affections and catarrh of the nose and throat.

℞ Ol. gaultheriæ,	0.42 c.c. (♏ vij)
Camphor menthol,	0.97 gm. (gr. xv)
Cocainæ hydrochloratis,	0.12 gm. (gr. ij)
Benzoinol,	30.00 c.c. (℥ j)

Use with nebulizer for acute colds, sore throat, and in all cases of acute inflammation or congestion of the upper air passages and middle ear.

℞ Ol. gaultheriæ,	1.90 c.c. (ʒ ss)
Cocainæ hydrochloratis,	0.260 gm. (gr. iv)
Menthol,	0.650 gm. (gr. x)
Benzoinol,	30.00 c.c. (℥ j)

Use with nebulizer for acute bronchial and pulmonary congestion and inflammation, also in irritable cough of tuberculosis.

℞ Creasoti (beechwood),	1.00 c.c. (♏ xv)
Ol. picis liq.,	1.00 c.c. (♏ xv)
Benzoinol,	30.00 c.c. (℥ j)

Use with nebulizer in pulmonary and laryngeal tuberculosis. Healing and antiseptic.

℞ Iodi,	0.32 gm. (gr. v)
Ol. picis liq.,	.92 c.c. (♏ xv)
Camphor-menthol,	2.00 c.c. (gr. xxx)
Ol. gaultheriæ,	1.00 c.c. (♏ xv)
Albolene,	30.00 c.c. (℥ j)

Use with nebulizer for chronic naso-pharyngeal and bronchial catarrh. Alterative and antiseptic.

Pastilles.

A delightful way of prescribing many drugs for local use in the pharynx, larynx and in tonsillar affections is in pastilles. Those prepared in *Päte de Jujube* are palatable and soluble.

Among those frequently prescribed are: Ipecacuanha, menthol, cocain and red gum, benzoinated voice, chlorate of potash and borax, red gum, eucalyptus and cocain, codein, compound eucalyptus, compound guaiacum, compound rhatany and cocain, red gum and chlorate of potash, chlorate of potash, borax and cocain, eucalyptus oil, menthol and rhatany, tannin, cayenne and black currant, tannin and black currant, menthol and eucalyptus.

Lozenges.

The following lozenges are after the formula of Sir Morell Mackenzie and are known as Bosworth's London Hospital throat lozenges. These lozenges, with the exception of those containing carbolic acid, are made with black currant and red currant fruit pastes, and are prescribed for their immediate local effect. Most of the lozenges contain from 70 to 80 per cent. of fruit pastes, 1 to 2 per cent. of powdered tragacanth, 4 per cent. of sugar, and varying quantities of the medicaments, according to the formulæ given.

The excipients used in these lozenges allay irritation, and assist the proper action of the medicine.

TROCHISCI ACIDI BENZOICI.

(Each lozenge contains $\frac{1}{2}$ gr. benzoic acid.) Marked B. A.
Use: A most valuable stimulant and "voice lozenge."

TROCHISCI ALTHEÆ.

(Each lozenge contains $1\frac{1}{7}$ gr. decorticated marshmallow.)
Use: Emollient: valuable after excision of the tonsils or uvula.

TROCHISCI ACIDI CARBOLICI.

(Each lozenge contains 1 gr. carbolic acid.) Marked C. A.
Use: Antiseptic and stimulant.

TROCHISCI CATECHU.

(Each lozenge contains 2 gr. extract of catechu.) Marked C. T. *Use:* Astringent.

TROCHISCI POTASSÆ CHLORATIS.

(Each lozenge contains 3 gr. of chlorate of potassium.) Marked P. *Use:* Stimulating and antiseptic.

TROCHISCI LACTUCÆ.

(Each lozenge contains 1 gr. of extract of lettuce.) Marked L. *Use:* Soothing and mildly sedative.

TROCHISCI SEDATIVI.

(Each lozenge contains $\frac{1}{16}$ gr. extract of opium.) Marked S. *Use:* Sedative for irritating coughs.

TROCHISCI ACIDI TANNICI.

(Each lozenge contains $1\frac{1}{2}$ gr. tannic acid.) Marked T. *Use:* Strongly astringent.

ACONITE, $\frac{1}{16}$ gr.

ALUM AND KINO.

Alum 2 gr.; kino 2 gr.

GUAIAC AND TANNIN.

Guaiac 2 gr.; tannin 1 gr.

CAPSICUM, $\frac{1}{5}$ gr.

TANNIN AND CHLORATE POTASSA.

Tannin 1 gr.; chlorate potassa 2 gr.

POTASSIUM BROMID, 4 gr.

MURIATE AMMONIA, 2 gr.

SALICYLIC ACID, $\frac{1}{2}$ gr.

MUR. AMMONIA AND GUAIAC, 1 gr. each.

BORACIC ACID, 3 gr.

BENZOIC ACID AND CUBEB.

Benzoic acid $\frac{1}{2}$ gr.; cubeb $\frac{1}{2}$ gr.

BENZOIC ACID AND GUAIAC.

Benzoic acid $\frac{1}{2}$ gr.; guaiac 2 gr.

BENZOIC ACID AND MUR. AMMON.

Benzoic acid $\frac{1}{2}$ gr.; mur. ammon. 2 gr.

ZINGIBERIS, $\frac{1}{5}$ gr.

GUAIAC, 5 gr.

GUAIAC AND CHLOR. POTAS., 2 gr. each.

GUAIAC AND CATECHU, 2 gr. each.

TROCHISCI CUBEBÆ.

(Each lozenge contains ½ gr. of cubebs.) Marked C. B. *Use:* Very serviceable in diminishing excessive secretions of mucus from pharynx, larynx and trachea.

TROCHISCI KINO.

(Each lozenge contains 2 gr. of kino.) Marked K. *Use:* Astringent.

TROCHISCI GUAIAC.

(Each lozenge contains 2 gr. guaiacum resin.) Marked G. *Use:* A specific for arresting crescent inflammation of the tonsils and pharynx.

TROCHISCI KRAMERIÆ.

(Each lozenge contains 3 gr. of rhatany.) Marked R. *Use:* A very powerful astringent, rhatany, does not disagree with the stomach, as is often the case with tannic acid, nor does it cause constipation.

TROCHISCI PYRETHRI.

(Each lozenge contains 1 gr. pellitory.) Marked P. R. *Use:* A very valuable sialagogue.

TROCHISCI HÆMATOXYLI.

(Each lozenge contains 2 gr. ext. logwood.) Marked L. W. *Use:* Mildly astringent.

TROCHISCI POTASS. ET TAREACIDÆ.

(Each lozenge contains 3 gr. acid tartrate of potassium.) Marked T. P. *Use:* Topical sialagogue.

TROCHISCI POTASSÆ CITRATIS.

(Each lozenge contains 3 gr. of citrate of potassium.) Marked C. P. *Use:* Topical sialagogue.

EUCALYPTUS, 3 gr.; chlo. pot. 1 gr.

EUCALYPTUS CUBEB, ½ gr.

KRAMERIÆ AND CHLORATE OF POTASSIUM.

Kr. and chlor. potass., 2 gr.

Muriate Ammonia and Cubeb.
Muriate ammonia, 1 gr. ; cubeb, 1 gr.
Salicylic Acid and Chlorate Potassium.
Sal. acid, ½ gr. ; chlor. potass., 2 gr.
Muriate Ammonia and Chlorate Potassium., 1 gr. each.
Bismuth, 2 gr.
Cubeb and Chlorate Potassium.
Cubeb, 1 gr. ; chlor. potass., 2 gr.
Krameriæ and Tannin.
Krameriæ, 2 gr. ; tannin, 1 gr.
Benzoic Acid and Guaiac.
Benzoic acid, ½ gr. ; tannin, 1 gr.
Borax, 2½ gr.

Suppositories.

Aural Suppositories. — In many affections of the external auditory canal or middle ear the following prepared suppositories are recommended :

℞	Bismuthi subnit ,	.06 gm. (gr. j)
	Ac. benzoici,	.06 gm. (gr. j)
℞	Bismuthi subnit.,	.12 gm. (gr. ij)
	Ac. benzoici,	.06 gm. (gr. j)
	Iodoformi,	.06 gm. (gr. j)
	Ac. tannici,	.12 gm. (gr. ij)
℞	Iodoformi,	.06 gm. (gr. j)
	Ac. tannici,	.18 gm. (gr. iij)
℞	Ac. borici,	.06 gm. (gr. j)
	Ac. tannici,	.06 gm. (gr. j)
℞	Ac. borici,	.06 gm. (gr. j)
	Ac. tannici,	.12 gm. (gr. ij)
℞	Zinci sulphocarb.,	.12 gm. (gr. ij)
	Zinci sulph.,	.06 gm. (gr. j)
℞	Hydrarg. oxidi flavi,	.06 gm. (gr. j)
℞	*Hydrarg.* oxidi flavi,	.18 gm. (gr. iij)

℞	Hydrarg. chlor. cor.,	.06	gm.	(gr. j)
	Hydro. chlor. mite,	.06	gm.	(gr. j)
℞	Hydrarg. chlor. cor.,	.006	gm.	(gr. $\frac{1}{10}$)
	Hydro. chlor. mite,	.12	gm.	(gr. ij)
℞	Ac. salicylici,	.06	gm.	(gr. j)
	Ac. borici,	.06	gm.	(gr. j)
	Ac. tannici,	.06	gm.	(gr. j)
℞	Ac. salicylici,	.12	gm.	(gr. ij)
	Ac. borici,	.06	gm.	(gr. j)
	Ac. tannici,	.12	gm.	(gr. ij)
℞	Thymol,	.03	gm.	(gr. ss)
	Eucalyptol,	.06	c.c.	(♏ j)
	Chloral hydrate,	.06	gm.	(gr. j)
℞	Morphinæ sulph.,	.008	gm.	(gr. $\frac{1}{8}$)
	Atropinæ sulph.,	.0002	gm.	(gr. $\frac{1}{200}$)
℞	Cocainæ hydroch.,	.0013	gm.	(gr. $\frac{1}{50}$)
	Morphinæ sulph.,	.008	gm.	(gr. $\frac{1}{8}$)
℞	Cocainæ hydroch.,	.06	gm.	(gr. j)
	Morphinæ sulph.,	.0032	gm.	(gr. $\frac{1}{20}$)
℞	Cocainæ hydroch.,	.001	gm.	(gr. $\frac{1}{50}$)
	Potassii chlorat.,	.06	gm.	(gr. j)

Nasal Suppositories. — The prescribing of suppositories for the nostrils is not universal. The indication for this form of therapy is frequent and too often neglected by the rhinologists.

℞	Potassii chlorat.,	.12	gm.	(gr. ij)
	Thymol,	.03	gm.	(gr. ss)
℞	Potassii chlorat.,	.18	gm.	(gr. 3)
	Thymol,	.03	gm.	(gr. ss)
℞	Bismuthi subnit.,	.06	gm.	(gr. j)
	Eucalyptol,	.06	c.c.	(♏ j)
℞	Iodoformi,	.06	gm.	(gr. j)
	Thymol,	.03	gm.	(gr. ss)

℞	Iodoformi,	.06	gm.	(gr. j)
	Ac. tannici,	.12	gm.	(gr. ij)
℞	Hydrarg. chlor. cor.,	.002	gm.	(gr. $\frac{1}{30}$)
	Potassii chlorat.,	.06	gm.	(gr. j)
℞	Hydrarg. chlor. cor.,	.002	gm.	(gr. $\frac{1}{30}$)
	Potassii chlorat.,	.12	gm.	(gr. ij)
℞	Ac. borici,	.06	gm.	(gr. j)
	Sodii biborat.,	.12	gm.	(gr. ij)
	Thymol,	.03	gm.	(gr. ss)
℞	Ac. borici,	.12	gm.	(gr. ij)
	Sodii biborat,	.18	gm.	(gr. iij)
	Thymol,	.06	gm.	(gr. j)
℞	Ac. benzoici,	.12	gm.	(gr. ij)
	Iodoformi,	.06	gm.	(gr. j)
	Hydro. chlor. cor.,	.002	gm.	(gr. $\frac{1}{30}$)
	Cocainæ hydroch.,	.002	gm.	(gr. $\frac{1}{30}$)
℞	Cocainæ hydroch.,	.06	gm.	(gr. j)
℞	Cocainæ hydroch.,	.0012	gm.	(gr. $\frac{1}{5}$)
	Morphinæ sulph.,	.008	gm.	(gr. $\frac{1}{8}$)
℞	Cocainæ hydroch.,	.06	gm.	(gr. j)
	Morphinæ sulph.,	.03	gm.	(gr. ss)
	Atropinæ sulph.,	.0006	gm.	(gr. $\frac{1}{100}$)
℞	Cocainæ hydroch.,	.001	gm.	(gr. $\frac{1}{5}$)
	Eucalyptol,	.06	c.c.	(♏j)
	Thymol,	.06	gm.	(gr. j)
℞	Morphinæ sulph.,	.008	gm.	(gr. $\frac{1}{8}$)
	Zinci oxidi,	.12	gm.	(gr. ij)
℞	Morphinæ sulph.,	.03	gm.	(gr. ss)
	Zinci oxidi,	.06	gm.	(gr. j)
	Bismuthi subnit.,	.12	gm.	(gr. ij)
℞	Bismuthi subnit.,	.18	gm.	(gr. iij)
	Cocainæ hydroch.,	.016	gm.	(gr. ¼)

℞	Ac. tannici,	.12 gm.	(gr. ij)
	Iodoformi,	.06 gm.	(gr. j)
	Cocainæ hydroch.,	.01 gm.	(gr. ¼)

Inhalations.

This form of treating the mucous membranes of the upper air passages has for a very long time received the universal recognition of the medical profession. Numerous instruments of simple and complicated construction, all on the same principle, are on the market. The principle involved is that certain drugs in boiling water or steam give off their volatile elements. The steam thus impregnated can be carried deep into the large bronchi. Inhalations are of special value in treating laryngeal affections. Those remedies recommended especially possess the virtue of being antiseptic, astringent and sedative, among which are:

℞	Tinct. benzoini comp.,	15.00 c.c.	(℥ ss)
	Aquæ,	q.s. 480.00 c.c.	(℥ xvj)
℞	Ac. carbolici,	.92 c.c.	(gtt. xv)
	Aquæ,	q.s. 480.00 c.c.	(℥ xvj)
℞	Tinct. iodi,	0.42 c.c.	(gtt. xv)
	Aquæ,	q.s. 480.00 c.c.	(℥xvj)
℞	Creasoti,	.92 c.c.	(gtt. xv)
	Aquæ,	480.00 c.c.	(℥ xvj)
℞	Tinct. opii,	3.75 c.c.	(ʒ j)
	Aquæ,	30.00 c.c.	(℥ j)
℞	Ferri perchloridi,	.12 c.c.	(gtt. ij)
	Aquæ,	30.00 c.c.	(℥ j)
℞	Zinci sulphatis,	.12 gm.	(gr. ij)
	Aquæ,	30.00 c.c.	(℥ j)

The following formulæ are from the London Throat Hospital:

℞	Creasoti,	2.10 c.c.	(gtt. xxxij)
	Magnesii carbonat.,	3.75 gm.	(ʒ j)
	Aquæ destill.,	30.00 c.c.	(℥ j)

℞	Ol. cubebæ,	.06 c.c.	(gtt. j)
	Magnesii carbonat.,	1.30 gm.	(gr. xx)
	Aquæ destill.,	30.00 c.c.	(℥ j)
℞	Ol. origani,	.30 c.c.	(gtt. v)
	Magnesii carbonat.,	.26 gm.	(gr. iv)
	Aquæ destill.,	30.00 c.c.	(℥ j)
℞	Ol. pini sylvestris,	2.50 c.c.	(gtt. xl)
	Magnesii carbonat.,	3.75 gm.	(ʒ j)
	Aquæ destill.,	30.00 c.c.	(℥ j)
℞	Spt. camphoræ,	3.75 c.c.	(ʒ j)
	Spts. vini rect.,	1.95 c.c.	(gtt. xxx)
	Aquæ destill.,	30.00 c.c.	(℥ j)
℞	Ol. juniperi anglici,	1.90 c.c.	(gtt. xxx)
	Magnesii carbonat.,	.97 gm.	(gr. xv)
	Aquæ destill.,	30.00 c.c.	(℥ j)

Sedatives.

℞	Succi conni anglici,		
	Tr. benzoin comp.,	āā 15.00 c.c.	(āā ℥ ss)
℞	Ferri sulph.,	.97 gm.	(gr. xv)
	Aquæ,	30.00 c.c.	(℥ j)
℞	Ferri et ammon. sulph.,	.97 gm.	(gr. xv)
	Aquæ,	30.00 c.c.	(℥ j)
℞	Ferri perchlor.,	1.90 gm.	(gr. xxx)
	Aquæ,	30.00 c.c.	(℥ j)
℞	Iodi,	1.92 gm.	(gr. xxx)
	Potass. iodidi,	.32 gm.	(gr. v)
	Aquæ,	30.00 c.c.	(℥ j)
℞	Lupulini,	1.92 gm.	(gr. xxx)
	Aquæ,	30.00 c.c.	(℥ j)
℞	Acidi hydrocyanici,	3.75 gm.	(ʒ j)
	Aquæ,	30.00 c.c.	(℥ j)

*Teaspoon*ful of the above formulæ to a pint of water.

ORGANO–THERAPEUTICS.

Thanks to the efforts of Brown-Sequard, animal therapy has, in the past few years, made a distinct advance in medicine. Among the many extracts, none brings greater practical results than suprarenal gland. Dr. Bates, of New York, gave it distinct impetus and positive position as a therapeutical remedy. Most animal extracts are prepared by extracting the juice from the glands, mixing with milk and sugar and drying at a low temperature.

The suprarenal extract is prepared from the dried capsules of the sheep and dispensed to the trade as a powder. For internal use in Addison's disease, diabetes insipidus, neurasthenia, bronchitis and other allied affections of the vaso-motoric system, the gland is prescribed in five-grain doses. As a hemostatic, preceding operation upon the nose or throat, only freshly prepared solutions should be used. The therapeutical effect of the dry powder is as effective, though the probability of infection is naturally enhanced, in consequence of which the majority of operators have long ago discarded the use of powder. Efforts are constantly being made to preserve the solutions and thus to avoid the inconvenience of preparing fresh solutions. With this object in view the following is recommended:

℞	Ac. boracici sat. sol.,	3.75 c.c. (ʒ j)
	Ac. carbolici,	0.12 c.c. (gtt. ij)
	Aq. camphoræ Aq. cinnamoni	āā 7.50 c.c. (āā ʒ ij)
	Ext. suprarenal gland,	3.75 gm. (ʒ j)

Dissolve the gland in one ounce of water, boil down to evaporation, add to the above and filter. This solution will remain sterile for a number of days, though it is best to remember that frequent boiling causes no diminution of strength, and renders the solution perfectly sterile.

In operating upon the nose, the field to all practical purposes is rendered free from hemorrhage.

Adrenalin Chlorid. — The active principle of suprarenal gland, isolated by Dr. Jokichi Takamine, is intended to supplant the use of the gland proper. It is put up for the trade in white crystalline form or in the solution 1/1,000, 1/5,000 and 1/10,000. It is more active than the solution of the gland proper and does not so quickly degenerate. However, after exposure, a deposit soon forms which contains fungi.

Upon the first application of the above to the mucous membranes, there is distinct blanching, which lasts throughout the operation. By preceding the use of cocain by the gland solution, the local effect of the cocain is enhanced, and the probability of constitutional disturbances is diminished. It is the observation of most operators that the subsequent hemorrhage after using the gland is greater than it would otherwise be, though such a condition is a trivial objection considering the great advantage gained. Where it is desired to prepare an ointment, the observation of the author is that it is best to dissolve the powdered gland in one or more ounces of water, evaporated to a thin paste, and mix with the base indicated.

℞	Antipyrini Salol	āā .40 gm. (āā gr. vj)
	Gland, adrenal,	5.20 gm. (gr. lxxx)
	Menthol,	.12 gm. (gr. ij)
	Adepis benzoinatis,	30.00 gm. (℥ j)

Other animal extracts especially used are those from the thyroid and thymus gland of sheep and pigs. The first is recommended in the treatment of psoriasis, eczema, lupus, sporadic cretinism, exophthalmic goiter, myxedema, etc. The last may be prescribed as enumerated above. The thymus gland causes no disturbance in the action of the heart, as noted following the administration of the thyroid extract.

ANESTHETICS AND NARCOTICS.

Local Anesthetics. — In the daily use of cocain it should be applied and so masked that patients are none the wiser for its use. It will be observed that a great many patients display a wonderful amount of knowledge relative to this drug and in a number of cases object to its use. For operative use a four per cent. solution freshly prepared is more often selected. Very few operations about the nose require a stronger solution. In dissection of the tonsils, eight to ten per cent. is recommended, while in paracentesis of the tympanum, a few drops of a ten per cent. solution should remain in the ear for at least ten minutes preceding puncture. For diagnostic purposes in the nose, a two to four per cent. solution is sufficient. The anesthetic effect is accompanied by drying of the mucous membrane and contraction of the blood-vessels. Its continued use is harmful to the mucous membrane. Cocain solutions should be frequently sterilized, as they rapidly deteriorate, being most effective when applied fresh and warm to the mucous surface. It may be applied either by cotton wrapped on a probe or by spray.

"The best antidote for the toxic effect of this drug is amyl nitrite and ordinary wine, placing the patient in a recumbent position." The application of the anesthetic value of subarachnoid injection of cocain in nose, throat and ear surgery is still undeveloped. Payne of San Francisco reports two simple mastoid operations and one Stacke operation under spinal analgesia.

The injection is made between the third and fourth lumbar vertebræ. The patient is placed in a reclining position, with back slightly bowed. The skin at the site of the injection is thoroughly cleansed; the surface is anesthetized by spraying with ethyl chlorid. With a glass syringe and needle three inches in length specially constructed twenty drops of a sterilized solution of cocain is injected into the subarachnoid space.

Eucain introduced as a substitute for cocain in the nose and throat may be used in five to ten per cent. solutions. Two preparations are dispensed: eucain alpha and eucain beta. The last is said to be 3.75 times less toxic than the former.

As previously remarked, solutions of cocain quickly deteriorate, while those of eucain retain their virtue indefinitely, though demanding occasional sterilization. The contraction of tissue is not so distinct, consequently as a diagnostic remedy applied to the turbinate, eucain is of little value, when used hypodermatically it is the equal of cocain.

Orthoform is a white, odorless, tasteless powder; a local anesthetic which is slow in action, and lasting in effect, covering a period of thirty-six to forty-eight hours. Since it is absolutely non-toxic it may be applied ad libitum, being especially recommended in the relief of pain in wounds, burns, excoriations, also after cauterization in the nose and throat, in dysphagia, and cough due to tuberculosis, and in ulcerated conditions of the pharynx and larynx, carcinoma, and abscess of the larynx, after operation on the mastoid, eczema of the ear and about the nose and in hay-fever. Freudenthal recommends the following emulsion:

℞	Menthol,	10.00 gm.	(ʒ ijss)
	Ol. amygdalæ dulcis,	15.00 c.c.	(℥ ss)
	Vitelli ovi,	15.00 c.c.	(℥ ss)
	Orthoform,	12.50 gm.	(ʒ iij)
	Aquæ destill.,	q. s. 100.00 c.c.	(℥ iij)

As a powder.

℞	Orthoform,	4.00 gm.	(ʒ j)
	Menthol,	2.00 gm.	(gr. xxx)
	Zinci stearatis,	4.00 gm.	(ʒ j)

Many drugs, though not so classed, possess more or less anesthetic properties. For instance in operating for paracentesis of the drum, the application of pure carbolic acid along the line of intended incision renders the operation as nearly painless as if obtained under cocain, and the caustic effect in no wise interferes with the healing of the drum. In dissection of the tonsils, or cauterization of the throat, the application of a ten per cent. solution of carbolic acid has a marked anesthetic effect.

Bonain recomm ing:

℞

.o gm. (āā gtt. xv)

Which is anesthetic.

℞	Ac. carbolici,	1.0 gm. (gtt. xv)
	Menthol,	
	Cocainæ hydrochloratis,	āā 0.5 (āā gr. viij)

An anesthetic and caustic.

These solutions, as remarked by the author, meet various affections of the ear. In the nose they may be used in exploratory puncture of the maxillary sinus, in galvano-cauterization of the turbinals, for ulcer or epistaxis, for reduction of inflamed tissue and lastly for anesthesia of the anterior orifices of the nasal fossæ, a region upon which cocain has no action. They should be applied every eight to ten minutes. It is valuable in the cauterization of hypertrophied adenoid tissue in the oropharynx, and at the base of the tongue, where cocain is often inefficient. In the larynx the anesthesia has been used for galvano-cauterization of the epiglottis and arytenoid eminences when infiltrated. It is efficacious when combating the dysphagia of tubercular ulcers of the pharynx and larynx, producing complete anesthesia, lasting at times for days. Bonain further recommends the caustic solutions for destroying tubercular vegetations.

Guaiacol, in oil, is recommended as a local anesthetic to the turbinated bones and in the removal of polypi of the nose and ear. For operations upon the tympanic membrane Bonain recommends the following formula:

℞	Guaiacol,	.6 gm. (gr. x)
	Menthol,	.3 gm. (gr. v)
	Cocainæ hydrochloratis,	.3 gm. (gr. v)

After cleansing the auditory canal the above is applied by means of a pledget of cotton. A complete anesthetic effect is obtained in three minutes.

Antipyrin in aqueous solutions or in oil has a peculiar anesthetic effect upon the mucosa of the turbinated bones. In acute coryza it is recommended in spray of one per cent. solution.

℞	Antipyrini,	1.90 gm. (gr. xxv)
	Tr. opii,	.60 gm. (gtt. x)
	Aquæ destill.,	90.00 c.c. (℥ iij)

As an anesthetic it may be used, preceding cocain or eucain, to the mucous membrane thirty minutes before operating.

Narcosis. — Narcosis as applied to surgery, is a condition of general unconsciousness produced by irrespirable gases more especially chloroform, ether, nitrous oxid, gas, or ethyl bromid.

Two conditions are essential to a safe narcosis, *i. e.*, the sound physical condition of the patient, and an experienced anesthetizer. Considering the fact that anesthetics are given by hundreds of physicians throughout the country, who are little versed in the skillful use of the same, we must confess such physicians possess an element of luck that so few deaths occur by this means. Only in the hands of those skilled in the administration of anesthetics should be placed the chance of the life of the patient and the reputation of the operator. Too many young physicians go out into the world with a poor conception of the danger of using anesthetics. The specialist starting on a promising career should be guarded in the choice of those who are to administer anesthetics to his patients. The physical condition of the patient must not, except in emergency cases, be overlooked. The mere fact that his heart beats are rhythmic and urine normal should not outweigh the general physical condition of the patient.

"Those with so-called lymphatic temperament, neurasthenics, anemics, chlorotics, and leukemics stand anesthetics and operations poorly" (Hamilton Fish).

As between ether and chloroform the majority of the operators regard chloroform as the safer anesthetic for children. As the scale of life advances ether promises the less risk to life. In laryngectomy and other operations upon the larynx and trachea chloroform promises best results. Likewise in mastoid operation, and in the extractions of foreign bodies from the external *auditory* canal, Asch operation, etc.

Chloroform is regarded by Wyeth as especially dangerous to children under twelve years of age, on account of lymphatic diathesis which at this age is most prevalent. Kalisko reports that in children dying from chloroform narcosis a condition described as "habitus lymphaticus" existed.

Ethyl bromid is a modern chemical discovery obtained by the distillation of a mixture of ethyl alcohol, sulphuric acid and potassium bromid. In its pure state it is a colorless liquid, having a chloroformic odor. It is dispensed in one-ounce tubes, one of which is sufficient to cause narcosis lasting one quarter of a minute. It is especially of service when operating upon children for adenoids and extraction of tonsils. The child is held in the nurse's arms in an upright position, wrapped in a sheet to guard against struggling. The small glass point of the bottle is broken off and the contents poured upon a napkin and held over the mouth and nose of the child. Narcosis is soon produced. Where a more lasting narcosis is necessary, the combination of chloroform and oxygen is recommended. D. Braden Kyle says: "Personally, I prefer chloroform and oxygen, and when administered by a competent anesthetizer, I think it as safe an anesthetic as can be employed."

The position of the child depends upon the length of the narcosis desired. If prolonged, as in the Asch operation, the patient is placed upon a table with head dropping down over the edge. In many operations upon the nose and throat, the Trendelenburg position is essential. In this way the probability of blood passing into the larynx is avoided, for, as remarked by Dr. Keen, "Blood will not flow up hill any more than water."

In regard to the use of sedatives, every physician has a general knowledge of their use and dosage as applied to affections of the ear, nose and throat. Drugs which act in a systematic way as a local sedative are possibly as often indicated as those with local effect. New drugs and derivations of old ones are constantly being introduced to the profession. Those best known are: morphin, codein, chloral, sulphonal, acetanilid, aconite, caffein citrate, atropin, blennostasin, heroin, chloretone, etc., the last two named being comparatively new products. Many of the above may better be classed as hypnotics.

Heroin hydrochlorate was introduced to the profession as a substitute for morphin and codein. It is a new morphin derivation acting promptly upon the congested mucous membrane and in combination with elixir terpin hydrate, is especially indicated for the relief of coughs and dyspnea. The averaga dose is one twelfth of a grain three times daily. On account of its ready solubility it can be combined with iodid of potassium, muriate or carbonate of ammonia, ipecac and elixirs.

Blennostasin is a derivation of cinchona alkaloid, and has a lasting effect upon the vasomotor system resembling the physiological effect of atropin upon the nasal mucous membrane. On account of the increased heart action, many patients object to the drug. It is non-poisonous, usually prescribed in one- to three-grain pills. If in one grain, one pill for the relief of acute coryza is given every hour; if in three grains, one every three hours.

Chloretone is a comparatively new remedy possessing hypnotic antiseptic and local anesthetic properties. As a hypnotic it may be used in three-grain tablets, as a sedative, in laryngeal and bronchial irritation it is best administered as an inhalation dissolved in oil. It is perfectly harmless.

ELECTRICITY.

Electricity is closely allied to massage. The best results of massage are frequently dependent upon electricity as an auxiliary (Dawse).

Electricity, as massage, is to be considered an adjunct to other therapeutical measures, as medicine, rest, etc.

In the ear, it is especially indicated in chronic catarrhal inflammations in anemia of the labyrinth, inflammatory exudations within the labyrinth and middle ear. It is indicated in torpidity of the endothelial lining of the middle ear, tympanum and Eustachian tube, want of auditory nerve activity, or partial paralysis, stenosis of the Eustachian tube, hyperesthesia of the labyrinth and neurasthenia.

In sclerosis of the middle ear, Dundas Grant recommends mechanical vibrations to the spine between the shoulders, as direct current causes indirect massage of the stapedio-vestibular joint.

There is a great disparity of opinion relative to the efficiency of electricity, brought about in many cases by want of knowledge of the pathology of the case, or the obscurity of the disease to determine its indication. Furthermore, to secure results, an accurate instrument must be used, combined with knowledge of electricity as applied to medicine.

As applied to therapeutics, the following forms are used: Faradic, galvanic, electro-cautery, static, X-ray, high frequency current, and advisedly, illuminating and electrotrephine.

The ampere is the unit of the rate of galvanic current flow. The number of ma. obtained as a dose in proportion to the effect desired expresses the rate of current flowing through the tissues. Increase indicates the intensity of action on the nerves and muscles. Rate of movement is an equally important factor in practical work with all the different currents. In static currents the rate of motion is the all-important factor.

The Faradic, as all understand, is characterized by being alternating and interrupted, while in the galvanic, the current is constant and continuous. The faradic has low amperage and high voltage, while the galvanic has greater amperage and low voltage.

"Faradism is indicated where we wish to excite the motor or sensory nerves, to affect certain organs supplied by the sympathetic nerve, and to increase the volume of the muscles. This is accomplished by exciting contraction, which increases the temperature and at the same time increases the nutrition. To relax a tense muscle or to loosen a peripheral contractor, single shocks from a strong current are generally more useful than a galvanic" ("Electro-therapeutics," Haynas).

The faradic current is especially indicated up to about 3 ma. in facial paralysis, following operations upon the mastoid or ossicles, sclerosis of the middle ear, hyperesthesia of the auditory nerve, hyperemia of the labyrinth, tinnitus where it is not dependent upon change in the circulatory system.

The faradic current for tonic effect should be generated from a fine, high tension coil, about 8,000 feet in length.

Up to a certain point the faradic current is a builder of tissue. When it reaches the point of irritation it acts as a destruction to tissue.

The Galvanic. — The galvanic current is more especially indicated where we wish to produce stimulation of the whole muscular and nervous system. A mild galvanic current is soothing to irritated nerve filaments.

Static Electricity. — Generated, as a rule, from specially constructed machines, administered in the form of bath, breeze, or inducted, and recommended in those disorders associated with disturbances of the trophic system.

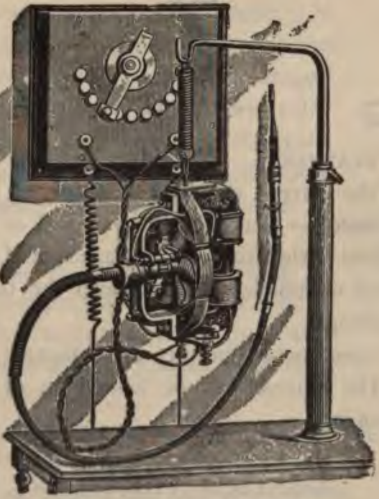
The X-ray is generated from a static machine or induction coil. The X-ray is indicated in the treatment of cancer, chronic ulcers, eczema, lupus, for the location of foreign bodies in the larynx, trachea, and those imbedded about the auricle.

Cautery. — It is scarcely necessary to mention the source of the current. Suffice it to say, the point for all purposes should be heated to a cherry red and applied to the affected parts. It is especially recommended in hypertrophy of the turbinals, applied directly to the mucous surface or driven deeply into the thickened turbinals. When withdrawing the point it is necessary that it remain heated, otherwise it will adhere to the tissue. Following the application of the cautery point, suppuration immediately takes place to the depth equal to the amount of destruction. If the operator exercises due care results, as a *rule, are very satis*factory; on the other hand, if we cause too great destruction of the tissues, the function of the mucous membrane may be entirely destroyed, and an atrophic degeneration may result. It is recommended especially in phlyctenular pharyngitis chronica, with varicosities of the small blood-vessels, in hypertrophy of the tonsils, in hemorrhage following operation for the removal of the tonsils, and in neoplasms of the respiratory tract.

"On account of edema produced the cautery should not be used about the uvula, the faucial pillars, arytenoid region or on the glosso-epiglottic fold. It should not be used upon the middle turbinale or the tissue above. Its application to the posterior end of the inferior turbinate is best avoided, likewise cauterization of the septum."

Electro-trephine. - May be used for the removal of spurs from the septum, opening into the antrum of Highmore, mastoid and frontal cells (Fig. 69).

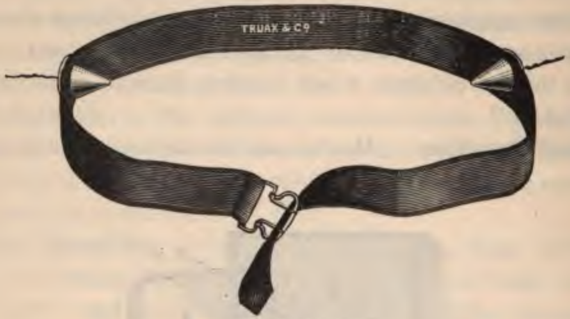
FIG. 69.



ELECTRO-CAUTERY AND TREPHINE.

Application of Electrodes. — In a given case demanding stimulation by the galvanic current the positive pole is applied to the affected part, the negative to the nape of the neck. Where a sedative influence is demanded the negative pole is applied to the affected part, and positive to the nape of the neck. The time of treatment should not last over five minutes as a whole. Bishop's ear electrode (Fig. 70) will be found very convenient for use in aural affections.

FIG. 70.



BISHOP EAR ELECTRODE.

TIME OF TREATMENT. — The seance should not last over five minutes and the current should not be over 3 ma. in strength.

Cautery Snare. — Used for the removal of enlarged tonsils or hypertrophies within the nose. Care should be exercised that the wire is kept at sufficient heat to sever the tissue without producing hemorrhage.

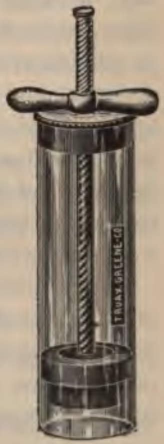
Especially constructed handles are adapted to the use of the physician. The current can be turned on or off instantly by means of a trigger.

GENERAL TREATMENT.

Local Depletion. — By this term we universally imply the n of vitiated blood from inflamed tissue. This is best ned by the natural or Heurteloup's leech.

The natural leech is a spindle-shaped worm, dark olive green in color. They are best known by the name of American, German or Spanish leeches. In all acute inflammations of the mastoid and middle ear they are in universal favor. In applying them to the surface it is best to prick the skin so that the leech may more readily attach itself. For convenience the leech is placed in a two-drachm bottle with its head directed toward the opening of the bottle, and in this position it readily takes hold after which the bottle is quickly removed. Before using it is best to pass the leech through pure clear water, freeing it as much as possible from all extraneous matter. Leeches gradually suck themselves full, finally relax and drop off. From one to two drachms of blood are usually extracted by a single leech. Leeches should not be used a second time. Formerly, leeches were applied to the inside of the nose and conjunctiva; they are now usually applied to the temple, side of the nose, tragus and, as mentioned, to the mastoid. If the amount of blood extracted is insufficient the continuation of bleeding can be encouraged by the application of hot water. As a rule, the hemorrhage from the wound is rather profuse and continues often for hours. Mechanical and chemical measures can be resorted to for its stoppage.

FIG. 71.



Artificial Leech. — The artificial leech of Heurteloup is best explained by the illustration. It is in many respects very unsatisfactory and should not be used when the natural leech is at the disposal of the surgeon.

Other local measures in inflammation are applications of tincture of iodin to the throat and mastoid, tincture of turpentine, and the dry cup. Cantharidal collodion is also used now and then as a blistering liquid to the mastoid and temple.

DIAPHORETICS. — "Indicated to stimulate superficial circulation, the elimination of morbid products through the skin, the promotion of metabolic changes and reabsorption of exudates."

Those now in universal favor are pilocarpin muriate, given in one tenth grain hypodermatically, and others such as jaborandi and salicylates. The latter are often disagreeable and should be disguised by giving in menthol waters. In addition, we have the dry pack (where patients are wrapped in woolen blankets and given jaborandi) hot-air baths, electric baths, and steam rooms, useful therefore in syphilitic affections, rheumatism, sclerosis of the middle ear, tinnitus and chronic conditions of the middle ear.

INUNCTION. — More especially applicable in the treatment of syphilis. For convenience, the mercury is carefully mixed with pure lanolin and dispensed in capsules, one capsule containing four grains of mercury, being sufficient for one treatment. The nurse should protect her hands with rubber gloves, otherwise before the cycle of inunction is completed she will, in all probability, suffer from the absorbed mercury. The inunction should be administered to the inner surface of the arms, legs and to the abdomen and chest. This should be continued daily until the symptoms of mercurialism are produced. Daily hot baths will be very efficacious in bringing about immediate results. While the cycle of inunction is in progress, due care should be given the teeth, keeping them clean. It is best to wash the teeth frequently with a weak solution of potassium chlorate.

CONSTITUTIONAL TREATMENT. — Consists in the administration of those remedies which are indicated to combat anemia, syphilis, and general debility, among which are preparations of hypophosphites, potassium iodid, iron, quinin, cod-liver oil, alterative compound, etc.

HYDROTHERAPY.

This form of treatment is especially indicated when we wish *to stimulate the* surface of the body, as a general tonic to the nervous system, and to stimulate free metabolic change in special portions of the body.

Foot Baths. — In many acute inflammations of the nose, throat and ear, warm foot baths are of great use in affecting the circulation to these parts by relieving congestion. Mustard meal may be added to the water to stimulate the skin circulation. The bath should last for one half hour. The patient is then put to bed, wrapped in blankets with hot-water bottles to the feet to guard against reaction.

Turkish Baths. — With this form of bath we have free sweating, and massage of the muscles. This form of therapy is especially indicated in many affections of the ear, nose and throat, especially when there is a chronic exudation within the sinuses of the nose, chronic pharyngitis, laryngitis, exudation within the labyrinth, etc.

Cold Baths are especially valuable as a general tonic to the skin and mucous membrane of the nose and throat. They should be taken upon rising, and thus aid in preventing colds. Baths are of value as a general tonic in hysterical neurasthenia, or general debility.

Warm Full Bath. — Should be given at a temperature of 100–110° F. Sea salt may be added to the water. This bath given daily will have a beneficial effect upon children suffering from a scrofulous diathesis, chronic purulent rhinitis, eczematous condition and general debility.

POST–OPERATIVE TREATMENT.

Cases requiring operative procedure as a rule demand subsequent local treatment many times for weeks.

After general anesthetic as in the Asch operation, operation upon the mastoid, etc., more or less shock and collapse may result which demand hot-water bottles to the feet, elevation of the foot of the bed, attention to the respiration, or the administration hypodermatically or by the mouth of brandy and strychnin sulphate.

In the opinion of the author it is bad policy to administer a general anesthetic in the physician's office. It is dangerous to perform tonsillectomy and tonsillotomy where there is a probability of a subsequent hemorrhage, in the private office of the physician. The grosser operations should be done at the private apartments of the patient, or in some well-equipped hospital, so that there can be no demand for an exertion on the part of the patient after the operation. Severe hemorrhages follow turbinectomy, or tonsillotomy more often follows in patients who are allowed to spend an hour or so in the effort to reach home. In operations of any proportion, where a local anesthetic has been used, it is wise to put patients to bed immediately.

After operation upon the nose or throat the patient should lie flat on his back with head and shoulders slightly elevated. For the first twelve hours, cracked ice dissolved in the mouth will aid in checking hemorrhage. If it is from the nose or tonsils and becomes profuse, cracked ice to the nape of the neck and hot-water bottles to the feet are recommended. Preceding and during operation, especially when cocain or eucain is used as an anesthetic, many patients become faint and nauseated. To the uninitiated these symptoms tend to rob the operator of a certain confidence essential to good work. This is due very often to a psychical condition, rather than to the narcotic effect of the local anesthetic. The patient soon revives under stimulants and words of encouragement from the operator. After many operations fainting is not a bad condition, sometimes being nature's relief for what otherwise might be a fatal hemorrhage.

Vomiting may follow local or general anesthesia. Patient suddenly becomes prostrated, pale and nauseated, with profuse excretions of saliva. The rejected matter is more often the stomach contents, as food substance, saliva, gastric juice and bile. Relief of depressing symptoms quickly follows emptying of the stomach. Where the vomiting becomes obstinate we must resort to some therapeutical remedy for its relief, *such as:*

℞ Acetanilidi,	.97 gm. (gr. xv)
Sodii bicarb.,	1.3 gm. (gr. xx)
Caffeinæ citratis,	.32 gm. (gr. v)

Fiat chart., No. v.

Signa, one powder with a little cracked ice or brandy and repeat in one hour if necessary (Journal American Medical Association).

"Very hot water or the other extreme, iced champagne or apollinaris, sometimes bring relief." Mustard to the epigastrium is also recommended.

Rectal enema, or hot water six to eight ounces to which is added a little brandy, will relieve the marked thirst which sometimes accompanies severe vomiting. Morphin hypodermatically and oxalate of cerium is efficacious.

Hiccough may be relieved by the use of morphin or iced champagne. Some recommend forcible extension of the tongue. The bladder should not be forgotten. If resort to the catheter is necessary, it should be sterilized previous to use. Hot applications to the bladder will often relax constrictor muscles.

After opening the mastoid, turbinectomy, operation upon the septum, removal of the tonsils, tracheotomy, etc., all solid foods are contraindicated. Fluid, soft and lastly solid diet, all in their natural course, are indicated as the severity and character of the operation demand. If after the second day there is not a free evacuation of the bowels, resort to enema or gentle laxative is imperative.

Hemorrhage may often follow operations upon the nose or throat. To prevent hemorrhage from the nose it is best to spray the nose with a solution of adrenalin chlorid (1–10,000). This should be repeated every half hour until all tendency to hemorrhage has passed away. It is sometimes necessary to pack the nose with strips of iodoform or bichlorid gauze, previously saturated with a solution of campho-menthol in albolene. Camphor and menthol are both slightly stimulating and the albolene will prevent the saturation of the gauze with blo
and lessen the liability of the gauze fibers adherin

When small spurs have been removed from the septum a thin strip of gauze saturated with the campho-menthol solution can be carefully placed over the wound and this in turn covered with thin strips of gauze. A safe rule to follow is that of never allowing the dressing to remain in the nose over forty-eight hours. When the septum is especially dressed as described above the small gauze strips covering the wound may remain for fifty-two hours, the nose being irrigated frequently with warm Dobell's solution. By this secondary hemorrhage may be prevented. The annoying feature of many operations upon the nose is the hemorrhage following the removal of the first dressing. To prevent this adrenalin 1–5,000 may be applied as far as possible to the mucous surface about the wound. The nasal mucosa should be partially anesthetized with a solution of cocain before the dressing is removed.

Rise of temperature after operation upon the ear, nose and throat is rare. If the operation has been accompanied by shock we may look for reactionary rise of temperature. If the temperature continues elevated an investigation for the cause is necessary.

Dr. Frank A. Morrison, of Indianapolis, relates a case apropos to this subject — a case of mastoid abscess. After thorough curettement and packing of the wound the temperature continued to rise. The day following, the temperature still remaining high, the wound was reopened and thoroughly investigated for any remaining septic matter. There was nothing found to indicate trouble in this region. On investigation the information was elicited from the patient that he had a disagreeable sensation in the rectum. On examination a large abscess was found. Being emptied of its contents the patient's temperature immediately subsided.

SPECIAL PART.

DISEASES OF THE AURICLE.

Frost-bite. — On account of the exposed situation of the auricle, the close attachment of the skin, the want of subcutaneous fat, and the lessened blood supply, the auricle is predisposed to frost-bite.

TREATMENT. — The treatment consists in the application of ice bags, snow or cold water, allowing gradual return to the normal temperature of the body. Should excoriation take place, the auricle must be thickly covered with benzoinated zinc ointment, or ichthyol one part to adeps benzoate seven parts.

Eczema. — Eczema is an acute, subacute, or chronic inflammation of the auricle, characterized by marked redness, formation of papules or vesicles, frequent leakage of a watery fluid, which, drying, forms crusts upon the surface. In the dry form there is more or less exfoliation of the epithelial cells of the skin, with tendency of the skin to crack open.

CAUSE. — Among the predisposing causes may be mentioned general predisposition of the skin to irritability from atmospheric conditions, excessive use of soap and water, rheumatic diathesis, or mechanical irritation. The exciting cause of eczema is a purulent discharge from the auditory canal, or a traumatic injury to the auricle by scratching with the finger nails. So far no organism has been isolated as a conclusive proof as a cause of this disease.

SYMPTOMS. — In the moist form of eczema the auricle will be found hyperemic and swollen, in the extreme forms the disease extends far into the meatus and round about the attachment of the auricle.

The skin has a glistening appearance with an irregular accumulation of gummy crusts. Through the surface will be observed a leakage of a watery fluid. There is present a constant itching and burning sensation.

In the mild forms the eczema may only attack the meatus, extending into the fossæ of the helix, or over the lobe of the ear, and presents a dry desquamatory condition with one or more fissures of the skin. There is a constant itching and predisposition to pick the ears. In the chronic stage the acute inflammatory symptoms have passed away, leaving a chronic exfoliation of the skin, with a thickened and fissured surface, and an accumulation of crusts.

TREATMENT. — If the disease is dependent upon otitis purulenta or causes above enumerated, relief may be expected only after the removal of the cause. In cases with crusts and scaly epithelium, peroxid of hydrogen, or preferably camphoroxol will cleanse the surface. Afterward, campho-phenique or vinegar of cantharides, may be applied in full strength, every two or three days, or the auricle may be covered with benzoinated oxid of zinc ointment or iodol one part to lanolin thirty parts, at the same time giving attention to the general tonic treatment, with Fowler's solution of arsenic in addition.

The following prescription as a general tonic is highly recommended by Shoemaker:

℞	Magnesii sulphatis,	20.00 gm. (ʒ v)
	Ferri sulphatis,	.60 gm. (gr. x)
	Acidi sulphurici dil.,	3·75 c.c. (ʒ j)
	Tinct. cardamomi,	30.00 c.c. (℥ j)
	Infus. coptis trifoliæ,	q. s. ad ft. 160.00 c.c. (℥ v)

M. Signa. A teaspoonful in a wine-glass of water, two or three times daily.

Lupus. — Lupus is a very rare condition in this country and is due to the bacillus of tuberculosis which may spread from the auricle to the meatus. Brown-red nodules, which subsequently *ulcerate, characterize* the disease. A slight secretion is present, inodorous and brownish in character. This attacks the skin more often than any other part of the body.

The treatment consists in the internal administration of cod-liver oil, or syrup hydriodic acid, guarded application of the X-ray, or galvano-cauterization of the diseased tissue and the application of some antiseptic and stimulating ointment.

Gangrene. — The various forms of this disease are seldom seen affecting the auricle. It may follow operation upon the mastoid, from trauma, or from frost-bite.

The *treatment* consists in the removal of necrotic tissue and the effort to secure asepsis. In the early stages warm stimulatory applications are valuable in restoring circulation and metabolic change. The pain can be controlled by dusting with aristol and orthoform in equal parts. Isolation and sterilization of clothing, towels, dressings, etc., is demanded.

Acute Perichondritis. — Acute perichondritis is usually due to trauma, characterized by pain and swelling, with effusion of serum between the perichondrium and cartilage, often causing deformity of the auricle.

The *treatment* is the application of cold ice bags, or towels wrung out of cold water. After effusion has taken place the cold is dispensed with and contents removed by free incision followed by careful antiseptic dressing, support and bandage of the auricle.

Chronic Perichondritis. — Chronic perichondritis is due to continued irritation of the perichondrium, usually seen in boxers and wrestlers.

TREATMENT. — The removal of the cause and of any disintegrated cartilage by surgical measures is indicated.

Intertrigo. — Intertrigo is very often seen in children of a strumous diathesis. In the old it is due to friction caused by prolonged use of bandages. The posterior surface of the ear and side of the head desquamate from friction, leaving an ulcerated surface resembling eczema.

The *treatment* consists in separating the auricle from the skin adjacent, cleansing with solution of mercury bichlorid 1–5,000 and dusting with aristol, with attention to constitutional treatment.

Hematoma. — Hematoma is an effusion of blood between the cartilage and the perichondrium as the result of a blow, often seen in the insane.

The *treatment* is the removal of the blood by means of an incision, packing with iodoform gauze and bandage.

Cystoma is a circumscribed collection of fluid, between the perichondrium and cutaneous covering, non-inflammatory in character.

The *treatment* is the same as that for hematoma.

Pemphigus. — Pemphigus is characterized by the formation of large blebs, filled with clear serous fluid. Blebs should be punctured and carefully dressed for a few days with 50 per cent. ichthyol solution or aristol.

Herpes. — Herpes is an affection of the auricle of a neuropathic origin. Severe pain and febrile reaction followed by hyperemia and a vesicular eruption are some of the symptoms. In mild cases the vesicles disappear without leaving any mark, but in the severe form small scars may result from the destruction of tissue.

The *treatment* subdivides itself into constitutional and local. The febrile symptoms should be treated with purgatives and antipyretics. When vesicles form and become purulent, they should be opened and dusted with calomel, aristol or dermatol.

Erysipelas. — Erysipelas of the auricle is usually the result of extension of facial erysipelas. The auricle may become greatly swollen with complete closure of the auditory canal.

TREATMENT. — The treatment is the same as that recommended for erysipelatous inflammation in any other portion of the body. Paint with iodized glycerol or tincture of iodin and lead water. Suppurative conditions should be treated by making a deep incision into the affected areas followed by flushing with an antiseptic solution. Tincture of chlorid of iron in twenty-drop doses should be given three times daily. Patient should be confined to bed and placed under favorable hygienic surroundings.

Syphilis.[1] — The diagnosis of syphilis is usually based upon the history of the case. Purely local conditions are rare. The eruption is, as a rule, like that covering any other portion of the body. Gummata of the auricle are exceedingly rare.

The *treatment* is therefore constitutional, followed by local dressing with aristol and calomel, previously cleansing with some antiseptic, preferably corrosive sublimate, 1/5,000.

Ear-cough. — Ear-cough is due to the irritation of the auricular branch of the pneumogastric nerve, by the presence of some foreign body in the external ear, as inspissated cerumen, etc. In many cases of persistent throat-cough without local causes, the condition of the external ear should not be overlooked.

TREATMENT. — The removal of the foreign body usually results in a complete cure.

Neuralgia of the Mastoid. — Schwartz says: "For all cases in which a purely neurotic origin can be assumed the operation of opening the mastoid affords almost instant relief." There is usually no previous history of ear trouble. The pain begins suddenly and is continuous over the auricle and mastoid bone. Sattler, of Cincinnati, designates the pain as often hysterical and says the operation is a powerful suggestive measure.

Removal of Powder Stains. — This is not an uncommon condition presented.

TREATMENT. — Rhodes recommends the application of hydrogen peroxid.

Burns of the Auricle. — In burns of the auricle very often the neck is involved at the same time. Severe burns of the neck and ear may result from accidents which are not infrequent.

TREATMENT. — The object of the treatment is, primarily, to lessen the pain and prevent excessive connective-tissue formation. The dead and charred tissue should at once be removed. Peroxid of hydrogen is highly recommended as an antiseptic and cleansing agent. When the skin of the neck or auricle alone is involved, the parts should be cleansed with a solution of bicarbonate of soda and covered with the following:

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[1] See Specific Rhinitis.

℞	Zinc oxidi,	7.80 gm. (ʒ ij)
	Orthoform,	3.90 gm. (ʒ j)
	Adepis benzoinatis,	31.10 gm. (℥ j)

followed by a dressing of soft lint.

For the prevention of infection and pain, when the deeper structure is involved, Muench recommends 95 per cent. carbolic acid as a local application, which is immediately washed away with alcohol. The wound is carefully dressed to prevent infection.

Miscellaneous. — The various deformities of the ear may be congenital or acquired. Neoplasms vary in no wise from those in other portions of the body. Those presenting are hypertrophy and ossification of the auricle, congenital abscess of the auricle, or external meatus, fibroma, atheroma, lipoma, angioma, cystoma, papilloma, epithelioma and sarcoma. The general pathology of such growths will be studied in detail under the subject of malignant and non-malignant diseases of the nose.

DISEASES OF THE EXTERNAL AUDITORY CANAL.

Impacted Cerumen. — Impacted cerumen is recognized as a symptom rather than a disease. A history of sudden deafness without pain or vertigo is usually indicative of impacted cerumen. The wax glands occupy about two thirds of the canal. In health the secretions of these glands is disposed of by evaporation, and waving cilia of the cartilaginous portion of the canal which, by gravitation, and the effect of the movements of the jaw in talking and eating, cause the secretions to be thrown from the canal. The habit of picking the ears with pins, etc., may bring about an eczematous condition, when the wax becoming mixed with the exfoliated cells, readily dams up the canal.

TREATMENT. — The treatment consists in the careful removal *of the* impaction by disintegrating the mass with hydrogen peroxid, which is left in the ear a few minutes, and followed by warm water irrigation. The canal is dried by alcohol, fifty per cent., followed by the application of unguentum of yellow oxid of mercury (eight grains to the ounce) or dusting with iodol, with the instructions that the canal be examined every two or three months to prevent possible reaccumulation. In case the impaction can not be removed by gentle syringing it may be softened with the following:

℞	Sodii bicarbonatis,	1.30 gm. (gr. xx)
	Glycerini Aquæ destill.	āā 5.00 c.c. (āā ℥ ss)

Acute Circumscribed External Otitis or Furuncle. — Acute circumscribed otitis or furuncle is one of the most painful affections of the ear. It is often very difficult to locate the seat of the suppurative process on account of the marked swelling of the canal. Furuncle may be observed as a forerunner or as accompanying diabetes. The disease is due to infection with the staphylococcus pyogenes aureus or albus which gain entrance to the hair follicles or sebaceous glands.

TREATMENT. — If seen early, effort should be made to abort the attack by vigorous purging, cold applications and painting with campho-phenique, salicylic acid and collodion. Freeing the canal of any débris by syringing with hot solution of corrosive sublimate 1/5,000 is first indicated. Leeches to the distended parts are often indicated. After the disease has advanced resort must be had to hot applications of bags of hops, or salt, Japanese hot box, cleansing with peroxid of hydrogen, controlling the pain with hypodermic of morphia, internal administration of calcium sulphid two grains in combination with benzoate of soda, ten grains, three times daily. Any accumulation of pus should be evacuated by making a deep incision with a cataract knife. The canal should be carefully treated antiseptically, for the reason that so long as the staphylococcus pyogenes is present on the surface or in the epithelium a rence of the condition in any portion of the canal is pr

Chronic Circumscribed External Otitis is a localized area of chronic inflammation following a like acute condition due to an extension of infection from the surface to the deeper tissue, especially involving the sebaceous glands.

The *treatment* is directed to the free incision of the sebaceous cysts with the curettement of contents and lining membrane followed by daily cleansing of the canal and tampon of gauze saturated in twenty per cent. solution of ichthyol.

Otomycosis. — Otomycosis is a parasitic inflammation of the external meatus. Small black plaques covering the skin about the meatus characterize the disease. The meatus should be carefully cleansed with warm solution of mercury bichlorid 1/5,000, dusted with orthoform or aristol. Pure alcohol is highly recommended as a local application.

Diffuse Inflammation of the Meatus. — Diffuse inflammation of the meatus may be acute or chronic in character, due to a mechanical irritation, foreign body or pyogenic infection in the canal.

TREATMENT. — If the pain and inflammation is severe, local and general measures are indicated. Morphia hypodermatically, leeches to the tragus, iced or hot applications, according to the stage and severity of the inflammation. A deep incision into the meatus will relieve the engorged condition. Bishop recommends a twenty per cent. solution of campho-menthol in lanolin as comforting and curative in effect. Subsequent treatment consists in frequent cleansing of the surface followed by an application of ichthyol one part to lanolin ten parts.

Croupous and Diphtheritic Otitis. — Recognized as a concomitant condition resulting from a like infection in the pharynx, though diphtheria primarily of the canal has been reported by a number of observers. With the use of antitoxin in diphtheria the probability of secondary complications is reduced to the minimum.

TREATMENT. — The treatment consists in cleansing with *hydrogen* peroxid and dusting with trypsin (Morris). Antitoxin hypodermatically if the symptoms are severe may be given.

Hemorrhagic External Otitis. — Hemorrhagic external otitis is due to a mechanical or inflammatory interference with the venous supply.

Symptoms. — Small elongated hemorrhagic extravasations are noted, usually along the floor of the osseous portion of the canal.

Slight constitutional disturbances may accompany the disease.

Treatment. — The treatment consists in the relief of the constitutional symptoms, with chloral or bromids, rest in bed, opening of vesicles and dusting with aristol and orthoform in equal parts.

Exostosis and Hyperostosis. — On examination the character of the growth is usually diagnosed by hardness and peculiar nodular appearance. The growths may be single or multiple, covered with the normal skin. Bony growths of this character are a result of syphilitic or rheumatic diathesis. In exostosis there is a history of inflammation of the meatus, whereas in hyperostosis the growth is usually slow without previous inflammation.

Symptoms. — The subjective symptoms are a feeling of obstruction in the ear, with a constant desire to pick the ears. Partial deafness may result not alone from the size of the obstruction, but by the impaction of cerumen and foreign substances which may gain entrance into the canal.

Treatment. — Burnett advises the extraction of exostotic growths by surgical measures. His general advice in hyperostosis is to let the growth alone, especially if the canal is not totally obstructed. When the removal is indicated it is accomplished by the electric drill. Burnett also remarks that the bony growth in this condition is far more frequent than is supposed.

Foreign Bodies. — Foreign bodies are of little importance when lodged in the canal, if in the removal great care and skill are exercised. In children a general anesthetic is often necessary, though this should not be carried to the stage of ge narcosis.

Insects may often be driven from the canal or killed by the injection of warm water or by blowing into the meatus the fumes of chloroform from saturated cotton placed in a clay pipe, or an improvised funnel, then by gentle syringing, or with forceps, head-mirror and light, the body may be easily removed. Sometimes a very careful search must be made for white insects, such as moth, etc.

DISEASES AND INJURIES OF MEMBRANA TYMPANI AND MIDDLE EAR.

Rupture of the Membrana Tympani. — Rupture of the membrana tympani results from sudden condensation of air by direct violence, explosion of guns, etc. It is a disease not infrequent among miners and soldiers and sailors in time of battle. It may be caused by the brutal habit prevalent among certain classes of punishing children by boxing the ears. Rupture may also follow from fracture of the cranial bones, penetration of foreign bodies or the careless use of the massage otoscope.

TREATMENT. — The treatment consists of rest for the patient, careful search for the foreign body, cleansing the meatus with cotton dipped in alcohol, and afterwards dusting the wound with finely powdered aristol. Should it be found necessary to employ irrigation to free the canal of blood, etc., warm bichlorid solution 1/10,000 should be used. Great care should be exercised for fear fluids may be forced into the middle ear, thereby producing severe complications.

Epithelial Growths of the Membrana Tympani. — Growths of this character are exceedingly rare. The cause is usually associated with local irritation, due to the presence of a foreign substance.

TREATMENT. — The treatment is directed to cleansing the canal and the destruction of the growth by the careful application of 50 per cent. solution of chromic acid.

Polypi. — Polypi usually take their origin from a localized *necrotic area,* and are recognized as extremely small vascular tumors protruding through a perforation of the membrana tympani. They may be single or multiple. In structure they are as a rule composite and granulated tissue, covered with squamous epithelium. Other forms of polypi are fibroid and mucous.

TREATMENT. — When the tumor is very small the treatment consists in the application of 50 per cent. solution of chromic acid. Often the growth is large enough to be removed by Blake's snare. In the great majority of cases the tumor is small enough to be removed by curet. Simple twisting is sufficient to detach the growth if the pedicle of the tumor is in the attic.

Hyperemia. — Hyperemia of the drum is active or passive in character. The cause is usually due to an extension of a like condition from the middle ear, produced by acute or chronic coryza. Driving or exposure to cold are exciting causes of hyperemia of the drum.

TREATMENT. — Treatment depends essentially upon the origin and time of the disease first noted. If dependent upon some inflammation of the auditory canal or tympanic cavity, the conditions found readily suggest the form of treatment. Attention should be directed to the correction of any catarrhal condition of the Eustachian tube or post-nasal space.

Granulation. — Granulation of the drum is often caused by a chronic purulent otitis media. Chronic myringitis may be the exciting cause of granulation.

TREATMENT. — The treatment is directed to the destruction of the granulation with a strong solution of nitrate of silver or fifty per cent. solution of chromic acid.

Angioma are small pedunculated vascular tumors usually attached along the short and long process of the malleus, and result from an irritation caused by a chronic purulent inflammation of the middle ear.

TREATMENT. — If small the application of chromic acid in fifty per cent. solution may cause the tumor to become absorbed. It may be necessary to snare the tumor and carefully pack the car
to prevent hemorrhage.

Hematoma. — Hematoma is a small extravasation of blood between the layers of the drum, seen in cases characterized by hemorrhagic extravasation as in small-pox.

Treatment. — Absorption is usually slow. In consequence the small tumor should be excised, the ear cleansed with warm solution of mercury bichlorid 1/5,000 and dusted with equal parts of aristol and stearate of zinc twice daily until recovery.

Acute Myringitis. — Acute myringitis is a comparatively simple inflammation of the drum, due to trauma or extension of inflammation from the middle ear, demanding antiphlogistic measures, Leiter coil, or leeches to the tragus. Superficial vesicles should be carefully opened, the ear being previously irrigated with warm solution of corrosive sublimate 1/5,000. The irrigation should be continued each day until recovery is complete.

Chronic Myringitis. — Chronic myringitis is a comparatively rare disease, and results from acute myringitis, chronic suppuration of the drum, which may cause cicatricial change and thickening of the dermal layer. The drum head is covered with a serous exudation, which may become very offensive.

Treatment. — The treatment consists in daily cleansing with warm solution of corrosive sublimate 1/10,000 or camphoroxyl, followed by irregular applications of fifty per cent. solution of alcohol, application of ichtholdin, campho-phenique or dusting with orthoform. In those with a strumous diathesis, the elixir of three chlorids is very efficacious as a general tonic.

Acute Otitis Media. — This frequent disease is usually due to an extension of a catarrhal inflammation from the nose and nasopharynx, characterized by pain, hyperemia, swelling of the drum and lining of the membrane of the middle ear, with more or less exudation of serum.

Treatment. — The treatment depends upon the symptoms, which are exceedingly variable. When the symptoms are those of middle ear-ache without great exudation, the treatment consists in the inflation of the Eustachian tube, alkaline spray to the post-nasal space, two to three drops of eight per cent. solution of cocain, dropped into the ear, and afterwards hermetically sealing the canal with small pledgets of cotton or inserting into the ear a few drops of the following, which will bring immediate results.

℞	Chloralis camphoratis,	5 parts.
	Glycerini,	30 "
	Ol. amygdalæ dulcis,	10 "

(Alkaloid Clinic.)

A. H. Andrews recommends the following as virtually a specific:

℞	Sol. glycerini,	
	Ac. carbolici,	12½ per cent.

Signa. Apply on cotton. If the pain is severe apply every fifteen minutes.

As soon as the pain has disappeared the hyperemia and swelling of the Eustachian tube is quickly reduced by spraying the post-nasal space with alkaline solution, followed by the application of argentum nitrate eight grains to the ounce. The treatment of the external auditory canal and tympanum consists in dropping three to four drops of a solution of zinc sulphate eight grains to the ounce, into the ear and hermetically sealing with collodion. This is repeated twice daily until all symptoms have passed away. If the pain and effusion into the ear is great, dry hot applications, paracentesis, purging, antipyretics and rest in bed are indicated. The disease runs its course in from three to ten days.

Acute Otitis Media Suppurativa.—In acute otitis media there is no destruction of the epithelial lining of the middle ear, whereas in acute suppurative inflammation of the middle ear there is a greater or less necrotic condition of the epithelium brought about by some organism accompanying infectious disease or exposure to cold. Among the organisms found in this disease are: Staphylococcus pyogenes, albus and aureus, Friedlände pneumobacillus, Fränkel's pneumococcus and the tubercle bac

The *symptoms* of the disease are acute pain in the ear, tinnitus and deafness, which continue in great severity until rupture of the drum occurs or paracentesis is performed. The drum is seen to be very red and congested in the beginning of the attack. In a few hours or several days the drum begins to bulge from the accumulation within the middle ear. The temperature ranges from 101° to 103°. The disease is very often an accompanying condition of the grippe. When paracentesis is performed, the *prognosis* is more favorable than that following rupture of the drum. The tinnitus and slight deafness may continue for a few weeks after the inflammation has passed away.

TREATMENT. — With the presence of such an array of organisms and the probability of extension to deeper structures, with no favorable forecast of recovery, efforts should be made in the beginning to abort the disease. With this in mind, leeches to the tragus, saline cathartics, rest in bed, cold ice packs to the ear and opiates internally are indicated. If relief does not come quickly, paracentesis posteriorly and above the short process of the malleus, is indicated. Free bleeding is to be encouraged, by warm dry heat.

Many cases for want of attention may go on to spontaneous rupture. In such conditions the disease may end in recovery in a few days or lapse into a chronic condition.

The canal should be carefully freed of any accumulations by syringing the ear every hour if necessary. Sometimes the middle ear can be cleared of a great deal of pus by the use of the pneumatic otoscope. During the active inflammatory stage protargol in five per cent. solution is well borne. When the inflammatory stage has subsided the following formula may be used, preceded by careful cleansing:

℞	Zinci sulphatis,	.12 gm. (gr. ij)
	Ac. boracici,	.60 gm. (gr. x)
	Ac. carbolici,	.24 c.c. (gtt. iv)
	Glycerini *Alcohol*	āā 3.75 c.c. (āā ʒ j)

	Aquæ destill.,	ad 30.00 c.c. (℥ j)

Signa. M.

The post-nasal space so often involved in such cases should be treated together with any constitutional cachexia.

Chronic Otitis Media Purulenta. — As the name implies this is a chronic suppurative condition of the middle ear. It is the sequel of acute inflammation, characterized by fetid discharge, more or less destruction of the membrana tympani and epithelial lining of the middle ear, with often necrotic change of the osseous tissue. The microörganisms more frequently found are the streptococcus pyogenes and staphylococcus pyogenes aureus and albus.

TREATMENT. — When no necrosis of the antrum exists the treatment consists in thoroughly irrigating the canal with warm solution of mercury bichlorid 1/5,000. Should the perforation be too small to admit of free drainage it should be enlarged.

Gentle politzerization of the middle ear followed by the use of the pneumatic otoscope, will aid materially in freeing the middle ear of pus. Preliminary to drying with sterile cotton, a few drops of alcohol, of a strength to cause no pain, is dropped into the ear. This promotes evaporation and facilitates drying. If the perforation is very large aristol should be dusted over the surface of the middle ear. Hydrogen peroxid is not well borne in the middle ear, consequently can not always be relied upon. To render the thick tenacious pus more fluid, and easier of removal, Stetter recommends the following solution to be dropped into the ear three times daily:

℞	Potassi iodidi sol.,	1.25 c.c. (gtt. xx)
	Lysol puræ,	1.25 c.c. (gtt. xx)

followed by

℞	Methylene blue,	.06 gm. (gr. j)
	Aquæ,	30.00 c.c. (℥ j)

Signa. Apply to the ear twice daily for chronic discharge.

sound. Paracusis Willisii, or increased hearing power in the midst of noise, is often observed. Snapping sounds may be heard in the ears during deglutition, from the opening and closing of the Eustachian tube. The light spot may be entirely lost or changed in size and position. With a Seigel's pneumatic otoscope the vibration of the drum is observed to be partially or completely lost.

The Eustachian tube will usually be found swollen and congested. Upon inflation with the catheter there is a perceptible increase in hearing. A high-pitched tuning fork is heard better through the air than a low-pitched tuning fork. Aërial conduction is decreased, Rinne negative. Musical sounds and voices may be heard but tones and words are often difficult of differentiation.

Objective symptoms are especially observable in the membrana tympani. The drum is more or less hyperemic along the long process of the malleus. The color of the drum is variable and presents an irregular thickened appearance. The drum is retracted, the short process of the malleus stands out knuckle-shaped. By the retraction of the drum the long process is retracted and the short process is rotated outward, the drum thus presenting the appearance of being stretched tightly over the short process.

TREATMENT.— It is necessary that growths, hypertrophies, adenoids, deflection of the septum and spurs be removed to prevent obstructing the normal air pressure within the middle ear or contribute as a cause to passive congestion of the Eustachian tube. The degree of hearing restored after a long series of treatment will enable a positive conclusion as to ultimate results. Catarrhal inflammation of the nose and naso-pharynx should be treated. The patient should be placed in as favorable hygienic surroundings as possible. Stricture of the tube may be removed by electrolysis or by passing a small rubber bougie, and inflating through the Eustachian cannula, followed by the injection of medicated oil. After the tube is opened and free drainage is established, medication is easily accomplished. This may be done by the injection of ten per cent. solution of menthol and camphor, in albolene, through a silver cannula into the middle ear, the injection of oil by means of the middle ear vaporizer, or by forcing the fumes of camphor and iodin into the middle ear by means of the Dench middle ear vaporizer.

The Delstanche masseur should follow inflation to aid in breaking up the adhesions and stimulating the absorption of the cicatrized bands and exudations. The treatment should be given daily with gradual lengthening of time, until cure is complete, or the disease is seen to be at a standstill. Over-treatment is as dangerous as under-treatment. By weekly applications of medicated hot air treatment will be very efficient in many cases.

Sclerosis of the Middle Ear. — Sclerosis of the middle ear is especially due to prolonged hypertrophic catarrh of the middle ear. The connective tissue which results from the chronic catarrhal process undergoes a partial atrophy or sclerosis which may extend to the labyrinthian capsule. The ossicles become bound together by fibrinous bands, the stirrup agglutinates to the oval window, and the membrana tympani becomes thickened and retracted.

Diagnosis. — Objectively, the drum is thickened and retracted. The short process of the malleus stands out prominently, the drum being tightly stretched over the process. With the Seigel's massage otoscope, the drum is observed to be tightly adherent to the ossicles. Bone conduction is lessened and in some cases is absent. Tinnitus aurium and paracusis willisii are present. Deafness is progressive and temporarily increases with inflation. Lonenberg's test of inflating chloroform vapor, by the sensation of cold, differentiates sclerosis from other affections in which vapor feels warm in the middle ear.

Prognosis. — As a rule, prognosis is bad, the deafness steadily growing worse, regardless of treatment.

Treatment. — Treatment is very unsatisfactory and surgic measures are of little practical value. The massage otoscope, jection of campho-menthol in lanolin, into the middle ear through the Eustachian catheter, the administration of phosphorus, which alone, according to Seibenmann, promises some good given in ten to twenty c.c. of a 0.1 per cent. solution or glutoid capsules containing one per cent. phosphorus oil. Thiosinamin (Mercks), in three-grain doses twice daily, is recommended as promoting dissolution of fibrinous adhesions. Fischerich recommends a two per cent. aqueous solution of pilocarpin hydrochlorate as an injection to the tympanic cavity by means of a flexible catheter passed through a metallic Eustachian catheter well up into the tube. He begins with six to eight drops, gradually increasing to ten, twelve, fourteen and sixteen drops; the increase of the quantity of the injecting fluid depends upon (1) the stage of sclerosis; (2) the absorption capacity of the tympanic membrane; (3) the reaction as evidenced by each individual patient. Thirty to forty daily injections constitute this course of treatment. In long-standing chronic cases, forty to fifty injections may be made.

Eustachian Tubal Catarrh. — Eustachian tubal catarrh is an acute inflammation of the mucous membrane lining the eustachian tube, due to acute coryza, acute naso-pharyngitis, the entrance of some pathogenic microörganism or liquid substance into the tube while using the post-nasal douche or spray, or while in bathing, adenoid vegetation or enlarged pharyngeal tonsils. The attack usually continues over a fortnight.

TREATMENT. — The treatment consists in the careful cleansing of the post-nasal space with Dobell's solution and the application of argentum nitrate ten grains to the ounce to the tubal mouth by means of a cotton-tipped probe. In blowing the nose following the use of the douche or spray the patient should be instructed to make pressure upon one side of the nose only; by doing this free exit of air is permitted and the probability of forcing air or liquids into the tube and middle ear is reduced to the minimum. The patency of the tube can as a rule be restored by gentle inflation with the Politzer bag and catheter. In children the Politzer bag alone is used. After the tube is opened it may be treated by means of the Bishop improved inflator or as recommended by Dench, if after ten days, condition has failed to improve, stimulating applications in the form of vapors are indicated. This is done by means of the middle ear vaporizer[1] or Seeley's hot air applicator with Pynchon's inflator attached.

In the beginning of the disease the administration of ten grains of Dover's powders, with hot foot-bath previous to retiring, will lessen the severity. Passage of bougies is seldom indicated for opening the canal.

Stricture of the Eustachian Tube. — Stricture of the tubes is more often due to swelling from a catarrhal inflammation of the middle ear or the naso-pharynx. Small connective tissue bands varying in thickness and size are observed. The seat of the stricture is more often in the cartilaginous portion. The caliber of the tube is demonstrated by auscultation. If the stricture is due to fibrous bands and not to simple swelling, repeated application of bougie and an inflation with superheated air may promote the absorption of the new tissue and restore the patency of the tube. Failure by this method will necessitate the use of electrolysis.

Insulated Eustachian catheters especially constructed for this work are to be had at any instrument house. The gold elec-

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[1] Among the many preparations recommended by Dench for the treatment of the middle ear or Eustachian tube are the following :

℞	Menthol	āā 3.9 (ʒ j)
	Camphoræ	
	Alcohol,	30.00 (℥ j)
℞	Menthol	āā 3.9 (ʒ j)
	Camphoræ	
	Tinct. iodi,	30.00 (℥ j)
℞	Ol. eucalypti	āā 15.00 (ʒ iv)
	Ol. pini	
℞	Ol. caryophylli,	1.9 (♏ xxv)
	Alcohol,	30.00 (℥ j)

Chloroform and ether are not well borne and must be used in small quantities.

trode (Duels) attached to the negative pole is carefully passed through the rubber-covered catheter until it strikes the stricture, when the current is gently turned on; the positive pole to the nape of the neck, the strength being from 3 to 5 ma. There is no pain accompanying or immediately after the treatment. Treatment should be continued weekly until relief is secured. The Eustachian tube should not be inflated immediately after the electrical treatment.

Acute Tubo-Tympanitis. — Acute tubo-tympanitis is an acute hyperemic condition of the drum and the middle ear due to closure of the tube from acute inflammation.

The *symptoms* of acute tubo-tympanitis are a cracking sensation in the ear when swallowing, pain in the ear, partial deafness, though as described by Dench the deafness is not so great as in simple occlusion of the Eustachian tube, because the ossicles are not crowded together firmly as when no obstacle is offered to the displacement of the drum. The prognosis is usually dependent upon the severity of the inflammation. If the effusion into the middle ear is very great a change in the epithelium of the middle ear and tube may result which partially interferes with the normal hearing.

The *treatment* consists in the reduction of the hyperemia by leeches to the tragus, gentle inflation of the middle ear by means of the Eustachian catheter and washing out the nasal and post-nasal space. Application of nitrate of silver twenty grains to the ounce is indicated to the tubal opening of the Eustachian tube once daily. Tincture of aconite in one-drop dose should be given hourly for the first twelve hours. The intestinal tract should be freely flushed by some saline cathartic. Hot dry heat to the ear is of great value. The patient should remain indoors until the inflammatory stage has passed away.

Should effusion follow in the middle ear, paracentesis must be made. This is followed by irrigation of bichlorid of mercury 1/5,000. To prevent subsequent attacks, attention should be given to any abnormal conditions of the nose and throat with instructions in the use of suitable clothing.

SEQUELÆ OF CHRONIC OSTITIS MEDIA PURULENTA.

Among the sequelæ to be mentioned are: Granulation, polypi, caries, necrosis of the middle ear, necrosis of the ossicles, deafness, cholesteatoma, facial nerve paresis, and paralysis, caries of the temporal bone, meningitis, subdural abscess, cerebral and cerebellar abscess, sinus-phlebitis, mastoiditis acute and chronic.

Granulation.—Granulation is due to a proliferation of new cells with increased capillary blood-vessels from chronic suppuration.

TREATMENT. — The treatment consists in the daily application of as strong a solution of alcohol as can be conveniently borne by the patient. Curettement is often advisable.

Cholesteatoma. — This is a thick accumulation of epithelium cells in the middle ear, arranged in concentric masses. Small desquamatous particles may gravitate into the antrum. On account of the direct relation of the disease to chronic mastoid inflammation, this condition is one of special interest. The desquamatory cells will be found mixed with ill-smelling pus.

TREATMENT. — Careful treatment with camphoroxol or warm solution of bichlorid 1/5,000, followed by dropping a solution of iodoform and alcohol into the ear. The evaporation of the alcohol leaves the ear coated with iodoform. Pure carbolic acid dropped into the middle ear, and in a few seconds neutralized by eighty per cent. alcohol is highly recommended.

Necrosis of the Wall of the Auditory Canal. — This condition is observed more especially at the superior half of the canal, near the tympanic membrane, and is associated with suppuration in the attic or mastoid antrum.

The treatment consists in the daily application of ten per cent. solution of carbolic acid and glycerin. To prevent the formation of necrotic areas Oaks recommends the following:

℞	Ac. boracici,	5 per cent.
	Ac. salicylatis,	2 per cent.
	Alcohol,	50–90 per cent.

Should alcohol treatment fail to relieve the necrosis and bring about a reparative process, the necrotic areas should be curetted away under a local anesthetic. The wound should be dressed daily and tamponed with bichlorid gauze.

Necrosis of the Ossicles. — Necrosis of the ossicles may be partial or complete. Very often when the perforation is through Schrapnell's membrane the head of the malleus only will be involved. The necrosis may extend only to the incudo-stapedial articulation.

TREATMENT. — In a chronic purulent inflammation without involvement of the antrum mastoid, when local treatment has failed to cure the purulent discharge, ossiculectomy must be performed. This consists in the complete extirpation of the ossicles. The operation may be performed under a local or a general anesthetic. The auditory canal is thoroughly cleansed with a warm solution of bichlorid of mercury, 1/5,000. Adrenalin, 1/1,000, is applied to prevent hemorrhage. An incision is made with an angular knife, extending from the posterior lower quadrant of the drum following the periphery upward to the short process and then curving downward to the middle of the drum, along the long process of the malleus. By the turning down of the flap, the incudo-stapedial articulation is brought into view. This is severed by a small pointed knife. The incision is then extended into the anterior periphery of the tympanum to the membrana flaccida, which is incised together with the anterior and posterior ligaments binding the malleus. The malleus is then grasped below the short process by McKay's ear forcep, and by gently rocking to and fro it is gently detached and extracted. The incus is next extracted. It may drop down into the tympanic cavity, and then it can be removed only by a short-curved blunt hook. If it is desired to remove the stapes the short-hooked instrument is inserted into the foramen of the stapes, and by gentle traction to avoid fracture, is extracted. The tympanic cavity is thoroughly dried, dusted with iodoform, and iodoform gauze is inserted for drainage. Subsequent treatment is directed to the dressing and cleansing of the ear until recovery is complete.

Perforation of the Drum. — If not too large and of long standing the application of fifty per cent. solution of trichloracetic acid to the rim of the perforation will often bring about a closure by process of granulation.

Facial Nerve Paralysis and Paresis. — The cause must be diligently searched for. It will be found in abscess of the antrum, or, as related by Burnett, in syphilis, trauma, operation upon the mastoid, and neuritis from inflammation of the middle ear.

TREATMENT. — The course of the treatment after the removal of the cause is very satisfactory. Strychnin hypodermatically in $\frac{1}{30}$-grain dose once daily, faradic electricity as an adjunct to surgical measures and constitutional treatment is recommended.

Caries and Necrosis of the Temporal Bone. — Caries and necrosis of the temporal bone is very often difficult of diagnosis, on account of the destructive necrosis. This disease is often fatal. The sequestra of dead bone vary in size and it may be from the wall of the auditory canal, the ossicles, the cochlea and all deeper portions of the middle ear, the disease often ending in meningitis or brain abscess.

TREATMENT. — The treatment consists in the antiseptic irrigation of the middle ear, removal of any sequestra presenting, opening the mastoid in some cases, anodynes and tonics with nutritious diet.

Meningitis. — Meningitis may result from an extension of pyogenic infection direct from the middle ear or mastoid process, or by the process of metastasis. Direct infection is usually observed, the inflammation being sudden in its onset and usually fatal in its termination.

Meningitis from mastoiditis is slow in its inception and less fatal.

Abscess of the Cerebrum and Cerebellum. — Ninety-one *cent. of the* cases of cerebral and cerebellar abscess are sequelæ of chronic otitis purulenta (Grunert). The most frequent location of an epidural abscess is in the temporo-sphenoidal lobe, above the tympanic roof or in the cerebellum near the posterior wall of the petrous bone and usually in direct connection with the diseased bone.

SYMPTOMS. — The disease manifests itself after the otorrhea has continued for a long time. Early symptoms are localized headache, slow pulse, subnormal temperature, constipation, loss of appetite, vomiting and fetid discharge from the ear. There may be convulsions, facial paralysis, paralysis of the motor oculi, and allied nervous manifestations, characteristic of pressure in the motor and sensory areas of the cerebrum and cerebellum.

TREATMENT. — The radical Stacke operation is at once demanded, for the removal of all foci of necrosis, followed by a careful search for a fistulous opening, leading into the cranial cavity. The roof of the tympanum may be removed, and a portion of the posterior wall of the petrous bone, down to the internal lateral sinus. If the abscess can not be located upon the surface, puncture is indicated to locate the pus; this accomplished, full incision and drainage is necessary. The wound is gently packed with iodoform and bichlorid gauze, which acts as a drainage, and is protected by gauze dressing. Treatment should be continued until recovery is complete.

Acute Mastoiditis. — This may be a primary or secondary condition. The inflammation of the mastoid as a primary disease is one seldom observed. The infection probably finds its way into the pneumatic spaces from the naso-pharynx or through the blood and lymph-channels.

As a secondary disease it is the sequela of acute or chronic serous or purulent otitis media and results from exposure, inflation of the middle ear, exanthematous disease, la grippe, tuberculosis, syphilis and pathogenic infection.

The mastoid cells from continuity of tissue are more or less involved in every case of inflammation of the middle ear; abscess of the mastoid cells as a secondary infection is fortunately the exception. Excessive discharge of pus from the middle ear may so fill the external auditory canal, draining up into the aditus ad antrum with sufficient force, as to destroy the mucous membrane by pressure; infection follows with necrosis of contiguous bone.

Abscess of the mastoid may exist for months, according to Politzer, without subjective or objective signs.

The *symptoms* vary in individuals, manifesting themselves before or after paracentesis or spontaneous rupture of the drum. Tenderness, pain persistent or remittent, redness and swelling over the mastoid, bulging of the superior and posterior auditory canal are the prominent symptoms. The temperature varies from the normal to 104° F. If the case is observed before the rupture of the drum, the same will be seen bulging in the posterior and superior portion.

In simple inflammation of the mastoid especially in children the pain complained of is often very slight. This is especially so in those cases amenable to abortive treatment. In cases of more virulency the pain over the mastoid hourly increases and is not relieved until the cells are opened and drained. A sudden cessation of the discharge from the ear with tenderness over the mastoid is suggestive of serious mastoid complications. Those cases of streptococcus infection are suggestive of necrosis, and must be our guide for recommending operative procedure.

The *treatment* of acute abscess of the mastoid process is divided into medical and surgical. By medical is meant the use of minor surgical methods, and the application of antiphlogistic remedies which aid in the absorption of morbid products thrown out into the pneumatic spaces of the process. When seen early an effort should be made to abort acute inflammation of the mastoid. The application of cold by means of the Leiter Coil or cracked ice in rubber bags is especially indicated. This should be continued uninterruptedly for twenty-four hours. The patient should be absolutely confined to the bed, given light diet and gentle purgative. If pain and inflammation continue after forty-eight hours the radical operation is indicated. For the elevation of temperature acetanilid is indicated in five-grain doses, repeated hourly until fifteen grains have been taken (Dench). If drainage is not complete the drum should be incised, the incision extending and opening into Schrapnell's membrane. Constant attention should be given to freeing the middle ear of purulent discharge, by warm irrigation of a solution of bichlorid 1/5,000. The pneumatic otoscope may enable us to remove a great amount of pus from the middle ear.

When we have abscess formation with necrosis two surgical procedures are at our disposal: the *simple mastoid operation* and the *radical mastoid operation*.[1] The great majority of cases of suppurative mastoiditis require only the simple mastoid operation, that is the opening of the abscess cavity without opening the antrum. Results of this operation are more satisfactory, the wound heals more quickly, leaving a small scar.

The instruments necessary for the simple mastoid operation are a scalpel, artery forceps, periosteum elevator, two large retractors or speculum, three small gouges 3–5–6 mm. wide, small curet, small blunt probe, bone forceps, metal hammer filled with lead, Macewen's combined small curet and seeker, Stacke's guide, ligature, curved needle, antiseptic gauze and bandage.

The operation is performed under chloroform or ether narcosis, with the most rigid antiseptic precautions. The side of the head should be shaved a few hours preceding the operation, washed with soap and hot water, followed by washing with pure alcohol. The external auditory canal should be irrigated with bichlorid solution 1/5,000 and tamponed with iodoform gauze. A tampon dipped in bichlorid 1/1,000 should then be placed over the site of the operation. The instruments, with the exception of the knife, should be boiled for half an hour in one per cent. solution of carbolic acid and soda. The knife may be cleansed by dipping in pure alcohol and in formalin solution.

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[1] *Technique* of the radical mastoid operation will be referred to under treat-*nt of chronic mastoiditis.*

In the simple mastoid operation an incision is made beginning at the tip of the mastoid process, extending upwards and backwards in a curved line a half to three quarters of an inch behind the auricle to the superior auricular attachment, and then forward to the anterior attachment of the helix. On account of the severe hemorrhage we should avoid severing the linea temporalis. The first incision should be down to and through the periosteum. The edges of the wound are then separated with a retractor and the bleeding vessel ligated or compressed. The periosteum is then separated, the sight of election for opening into the cells and also the antrum, is above and behind the external auditory meatus, five millimeters behind the spine of Henle, and anterior to the mastoido-squamous suture. With a small chisel a portion of the cortex 1 cm. wide and 1.5 cm. long is chiseled away.

The thickness of the cortex varies in individuals as does also the amount of pneumatic suture; in children especially the pneumatic suture may be opened at the first incision of the knife. The abscess is soon reached, as shown by the presence of pus. The bony cavity is enlarged in the direction of the abscess cavity. With a spoon the necrotic tissue with granulations are scraped away and the wound tamponed with iodoform gauze. The question of opening the antrum at this time is decided by the condition of the wall separating the abscess cavity, which condition is easily demonstrated by the small Macewen curet and seeker. Should soft necrotic bone be observed a direct opening into the antrum is usually easily made with a sharp curet, without resorting to the gouge. The antrum and middle ear are then thoroughly disinfected by irrigation and tamponed with iodoform gauze. Strips of iodoform gauze are then placed in the external auditory canal, and bandage applied. The patient is then put to bed and the wound inspected in twenty-four hours. If found to be free from secretion and the patient complains of no pain or disturbance the dressing is left in place for four or five days, when it should be removed and a new tampon and gauze dressing applied. After twenty-four hours the patient may be allowed to sit up. At the end of fifty-two hours the patient may go about the ward. The time of recovery varies from three to ten weeks. Complications may arise, as continued high fever with dizziness, vomiting and radiating pain over the temple which are suggestive symptoms of meningitis, pachymeningitis or sinus phlebitis. Under such circumstances the wound is reopened and the radical operation performed with the exposure of the sinus or dura mater.

Chronic Mastoiditis. — Chronic mastoiditis is a chronic purulent inflammation within the antrum and mastoid cells, the sequela of acute purulent inflammation of the middle ear. The slow form of suppuration with necrosis of the epithelial cells lining the mastoid cells and subsequent change in the osseous structure is brought about by the imperfect drainage. New bone tissue may be formed as a result of the suppuration which partially fills the antrum, bringing about a condition known as osteosclerosis. From necrotic change in the walls rupture may occur on the external surface or in the cranial cavity. Pus from the antrum is usually thick and fetid. The retention of pus in the antrum from imperfect drainage during sleep may produce headache, dizziness and nausea upon awakening. The course of the disease is variable. Many patients go through life with a chronic slow form of necrosis in the mastoid without serious inconvenience, otherwise than from the discharge from the middle ear. In others a sudden onset of pain, redness and swelling of the mastoid with elevation of temperature, headache and nausea will suggest immediate operation for the evacuation of pus, granulated tissue and for the removal of necrotic bone in the antrum and the middle ear.

TREATMENT. — In chronic purulent mastoiditis without active inflammatory conditions, when all forms of therapy have been unsuccessfully tried, two methods of operative procedure are at our disposal — ossiculectomy and the radical mastoid operation. When active inflammatory changes have taken place in the antrum and cells or there is involvement of the cranial wall, the radical mastoid operation is the only alternative.

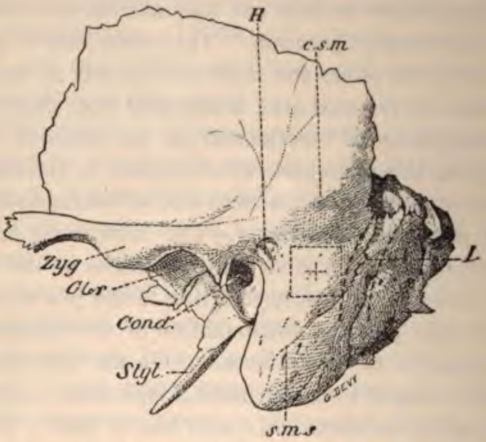
The operation of ossiculectomy consists in the removal through the auditory canal of the ossicles and the drum in their entirety (see ossiculectomy, page 164). Many cases of chronic purulent inflammation of the middle ear and antrum are cured by this comparatively simple operation. The results from this operation are sometimes very slow, and there is a liability of reoccurrence. The fact that the diseased attic is obscured from observation prevents thoroughness of curettement of the necrotic bone. In recommending this operation, which cannot be considered good surgery, uncertainty of a cure must not be overlooked.

Radical Mastoid Operation. — The indications for the radical removal of all cell spaces and the bones of the middle ear should be well marked before resorting to this procedure. Many cases of chronic purulent inflammation of the mastoid cells recover by a process of osteosclerosis. On the other hand, many cases slowly recover from the radical operation, subjecting the patient to great inconvenience and loss of time. It is well to remember the great danger which may momentarily result from the presence of pathogenic infection so near the brain and fully acquaint our patient with the conditions.

Among the alarming symptoms indicating the radical mastoid operation are headache, pyrexia, optic neuritis, cholesteatoma, excessive polypoid formations, paralysis of the facial nerve, dizziness, fistula of the mastoid, offensive discharge from the middle ear with general septic infection, and Bezold's disease, *i. e.*, rupture of the mastoid abscess of the inner side of the apex into the digastric fossa and beneath the sternomastoid muscle.

The true radical mastoid operation consists in the laying bare of the entire accessory cavities of the ear. The preliminary procedure varies in no wise from the simple mastoid operation with the exception that immediately following the separation of the cartilage the bony meatus is widened in the superior portion *by chiseling* away a small amount of bone, to give a better view of the field of operation. The small square opening is gradually enlarged in a funnel-shaped fashion, direct into the antrum, found at a depth varying from one eighth to three quarters of an inch.

FIG. 72.

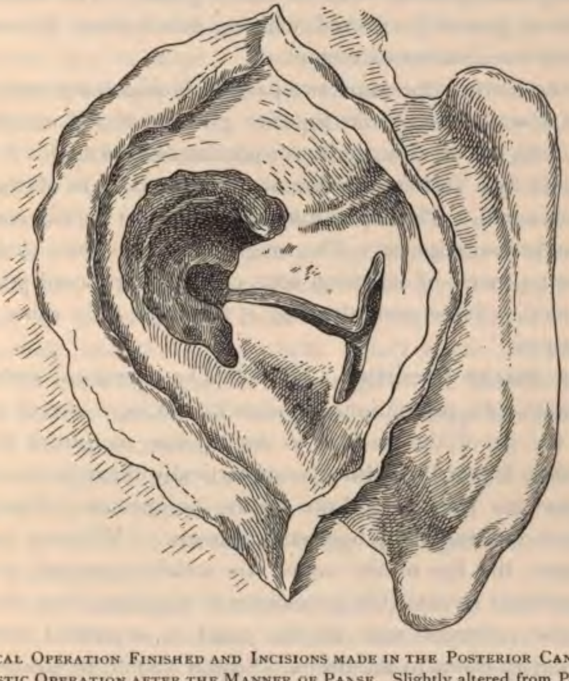


THE AREA OF OPERATION AND ITS RELATIONS TO THE SPINE OF HENLE (*H*), the two ridges, supra-mastoid (*c.s.m.*) and mastoido-squamous (*s.m.s.*), the lateral sinus (*L*) and the bony meatus (*Cond.*). (BROCA.)

The opening into the antrum is gradually enlarged, the mastoid cells opened and all necrotic tissue and granulations removed. Under strong illumination from head mirror and a Stacke guide in the aditus as a protection against injuring the facial nerve, semicircular canals, the thin bony wall separating the meatus and the antrum is then chiseled away, down to the thin bridge of bone separating the posterior and superior bony meatus from the middle ear. This with the ossicle and necrotic tissue is then removed. The floor of the tympanic cavity is carefully cleansed of all débris with strips of bichlorid gauze, and any granulations about the Eustachian tube curetted away. The artificial osseous canal is then made perfectly smooth by the aid of a chisel or curet preparatory to one of the plastic operations.

Before completing the operation, in severe cases, the roof of the antrum and the bone covering the sigmoid sinus should be carefully examined for any dark patches or perforations which are present in extra-dural abscess in the temporosphenoidal lobe or about the sigmoid sinus. All débris and septic material should be washed away with a hot saturated solution of boric acid. Healing takes place by a process of granulation from the bottom upward. In consequence of the great deformity following the radical operation, plastic operations are recommended as a substitute for

FIG. 73.



RADICAL OPERATION FINISHED AND INCISIONS MADE IN THE POSTERIOR CANAL FOR THE PLASTIC OPERATION AFTER THE MANNER OF PANSE. Slightly altered from Politzer's fourth edition.

the old method of plugging the post-auricular wounds with strips of gauze.

In the Panse plastic operation the posterior wall of the cartilage is split medially and a cross cut is made at right angles at the external meatus, and the corners stitched into the post-auricular wound which is immediately closed so that the opening into the excavated bony cavity is wide and easily accessible for subsequent dressing and packing with iodoform gauze. The floor of the wound is gradually covered with epidermis from the attached edges of the membranous canal.

In the Korner operation two parallel incisions are made in the external wall, one at the superior portion of the membranous canal, and the other at the lower portion of the canal. A tongue is formed by a vertical incision at the inner portion of the membranous canal. The flap or tongue is placed in the osseous canal, and packed with gauze. The tongue quickly adheres to the bone and by a process of extension soon covers the exposed portion of the canal. Subsequent dressing is the same as in other plastic operations.

The Stäcke Operation. — The Stäcke operation, under most rigid antiseptic precautions, consists in making a curved incision from the tip of the mastoid to the superior margin of the auricles, then forward to a line drawn vertically through the meatus. The incision is carried down to the periosteum. The hemorrhage is controlled by hemostatic forceps. With an Andrews speculum the lips of the wound are widely separated, and with a periosteum elevator the periosteum is separated from the bone, and the posterior wall of the canal is separated from the bony cavity down to the drum. Search should be made for the mastoid fossa of the spine of Henle, and when once located should be our guide into the mastoid antrum. With leaden mallet and chisel (the chisels varying from 5 mm. to 8 mm. in width) and a Stäcke protector in the tympanic cavity to prevent injury to the facial nerve, the outer wall is chiseled away, directly into the attic, without completely opening into the antrum.

The cavity is illuminated by electric head-mirror. The ossicles and granulated tissue are removed with small goose-necked forcep and curet. The antrum and cells are then opened in a reverse manner and necrotic tissue removed. When the operation is complete there remains but a single cavity. The membranous meatus is split in the posterior portion and placed against the osseous meatus and retained in position by tampons of iodoform or bichlorid gauze. The auricle and posterior wound are carefully dressed with a thick layer of cotton and gauze held in position by a bandage. The posterior wound is closed and subsequent dressing is through the meatus. The after treatment is directed toward keeping the wound in an antiseptic condition. Twenty-four hours following the operation the gauze packing should be removed, the wound dusted with iodoform and repacked. This treatment should be continued daily until repair is complete, which time is variable, usually from six to ten weeks.

Among the unfortunate accidents which may accompany antrectomy are wounding the facial nerve, the horizontal semicircular canals, and the lateral sinus. Only a close study of the position of these organs and a knowledge of the possible deviations from the normal will assist in preventing this accident, which is not an uncommon one.

Facial paralysis from neuritis may come on a few days after this operation and pass away in a very short time. A complete severing of the facial nerve will bring about paralysis which is usually permanent.

Accidental opening of the lateral sinus is not in itself dangerous to life. The hemorrhage is easily controlled by tampon of bichlorid gauze. The suspension of operative procedure may be necessary, though the majority of surgeons who meet with this accident tampon the wound and complete the operation.

DISEASES OF THE INNER EAR.

Spongifying of the Bony Capsule of the Labyrinth. — This is a condition of fixation of the stirrup by rarefying ostitis of the petrous portion of the temporal bone, especially round about the oval window of the labyrinth, occurring in individuals after eighteen years of age, and reaching a climax at the patient's twenty-eighth or thirtieth year. No objective symptoms of middle ear disease are observable. Siebenmann gives three diagnostic symptoms of the disease: (1) increased bone conduction, for "A"; (2) loss of hearing for low tones; (3) negative Rhinne. There is little or no improvement upon inflation of the middle ear or Eustachian tube.

TREATMENT. — No treatment can be of service in the cure of the disease.

Anemia of the Labyrinth. — This may result from simple or pernicious anemia or profuse hemorrhage from some portion of the body.

TREATMENT. — The treatment consists in the attention to the general condition, the administration of ferruginous tonics, strychnin, Burgundy wine at dinner and favorable hygienic surroundings.

Hyperemia of the Labyrinth. — Hyperemia of the labyrinth may result from the following: Middle ear inflammation, exanthematous disease, some intracranial disease, disease of the heart, excessive use of alcoholic liquors, quinin, amyl nitrite, prolonged irritation from the use of the telephone receiver, etc.

Treatment is local depletion, pilocarpin $\frac{1}{6}$- to $\frac{1}{8}$-grain daily by the mouth, the administration of bromid potassium, contra-indication of all stimulants, and the avoidance of any sudden physical exertion.

Inflammation of the Labyrinth (Otitis Interna). — Inflammation of the labyrinth is usually secondary to disease of the middle ear or mastoid, diphtheria, scarlet fever, measles or mumps. The patient complains of a sudden roaring sensation in one or both ears. Within twenty-four hours as a rule the patient becomes suddenly extremely dizzy with a tendency to fall to the *affected side.* In severe cares vomiting is present, which may *continue for a* number of hours. The sounds are high-pitched and continuous. On account of the dizziness the patient is compelled to remain quietly in bed for one to three weeks. No objective symptoms are present, other than a very slight hyperemia of the drum. The diagnosis is as a rule very easy. Partial or complete loss of bone conduction and hearing, high-pitched sounds on the affected side with marked disturbance of equilibrium all indicate the site of the lesion. Where the effusion or metastatic infiltration has lasted for any great length of time without any apparent change for the better, prognosis is usually bad.

TREATMENT. — The treatment consists in rest in bed, local depletion, leeches to the tragus back of the auricle and mastoid, application of Leiter coil or ice bags to the mastoid, morphia internally, rest in bed and liquid diet. After two weeks, with no relief of deafness, the internal administration of large doses of iodid of sodium is indicated. Elimination should be encouraged by daily hot bath.

Panotitis, or Inflammation of both the Middle and Internal Ear. — Panotitis, or inflammation of both the middle and internal ear, is accompanied by marked constitutional symptoms due to acute severe infectious disease, as scarlet fever, diphtheria, measles, etc. Necrosis of the thin wall separating the labyrinth from the middle ear may occur. The symptoms are general inflammation of the middle ear, tinnitus, vertigo, often purulent discharge from the middle extending to partial or complete deafness. Facial paralysis may result from extension of infection of the facial nerve.

TREATMENT. — The treatment is that recommended for the two diseases separately.

Syphilis of the Labyrinth. — A not infrequent disease occurring often in the tertiary stage. The diagnosis is easily established by history, subjective symptoms, tinnitus, progressive deafness and loss of bone conduction.

TREATMENT. — The treatment consists in large doses of **iodid** of potassium internally, inunctions of mercury over the mast *and irrigating* the canal with warm antiseptic solution. Pil pin hypodermatically $\frac{1}{10}$ grain daily for a week is indicated when there presumes to be exudation into the labyrinth. When the secondary changes from exudation and inflammation have lasted for some time, treatment is very unsatisfactory.

Hemorrhage into the Labyrinth. — Hemorrhage into the labyrinth may result from a blow on the head, fracture of the skull, atheromatous degeneration, or inflammation within the labyrinth.

TREATMENT. — The treatment, at the onset, is essentially palliative. After the passage of the acute symptoms, the administration of small doses of iodid of potassium and pilocarpin, to aid in the absorption of the hemorrhage is advisable.

Ménierè's Disease. — A disease of the semicircular canal, resulting from a sudden extravasation of blood or serous effusion, and is characterized by sudden deafness, vertigo and vomiting. In walking with the eyes closed, the patient inclines the head to the affected side. There is a partial or complete loss of bone conduction on the affected side.

TREATMENT. — Treatment rarely results in any good. Rest in bed, with cold applications to the head, cathartics and liquid diet, iodid of potassium, pilocarpin as in labyrinthitis, may exert favorable influence. Diluted hydrobromic acid, fifteen drops three times daily, is highly recommended.

Hysterical Deafness. — The treatment is directed to the removal of the hysterical state, with attention to the general nervous system.

Diseases of the Auditory Nerve. — Hyperemia, hypertrophy, atrophy of the nerve, secondary inflammation and suppuration in the middle ear are conditions causing or accompanying this disease.

TREATMENT. — The treatment is subjective, as no established treatment is advisable.

Hyperaudition. — Hyperaudition is an increase in the intensity of hearing power, due to cerebral excitement or irritation of *the auditory* nerve.

TREATMENT. — Treatment consists in rest, change of climate and general treatment. If due to slight catarrhal attack of the Eustachian tube and tympanic cavity, the treatment is as in those diseases heretofore mentioned. Sedatives, gelsemium and potassium bromid may be indicated for the cerebral condition.

Hyperesthesia. — Hyperesthesia is an oversensitiveness to sound, usually seen in nervous individuals.

TREATMENT. — If due to intercranial affections, the treatment is dependent upon the removal of the cause, and if due to sclerosis of the middle ear, massage may tend to lessen the hyperesthesia.

Paracusis. — Paracusis is a disease or a condition of the perceiving organs, characterized by perverted perception of sounds.

Sounds which are heard as double tones are known as paracusis diplacusis. Paracusis loci is an inability to locate direction of sounds. Sounds heard better in the midst of a loud noise are classified as paracusis willisii. Politzer describes the increase of hearing as due to the movements of the ankylosed ossicles.

The *treatment* of paracusis is directed to the removal of the cause, which is usually dry catarrh or sclerosis of the tympanic mucosa.

Nephritic Deafness. — This is a condition associated with nephritis. According to Morf, fifty per cent. of the cases under observation for nephritis have disturbances of hearing.

Tinnitus Aurium is a subjective condition, characterized by ringing and roaring sounds within or without the ears, and is dependent upon a disturbance in the nervous system, interference with the arterial supply to the ear, or disease of the perceiving or conducting apparatus.

TREATMENT. — The treatment is directed to the removal of the cause and the cure of the tinnitus. Foreign bodies in the auditory canal or on the drum should be removed. Disease of the middle ear should be treated according to the conditions presenting. Ten grains of ammonium bromid after each meal, or three doses at night, is a good prescription in disturbances the nervous system. If the tinnitus is due to cerebral anemia it may be relieved by glonoin.

If due to hyperemia aconite is well borne.

℞	Morphinæ sulph.,	.005 gm. (gr. $\frac{1}{12}$)
	Atropinæ sulph.,	.0005 gm. (gr. $\frac{1}{120}$)
	Caffeinæ citratis,	.01 gm. (gr. $\frac{1}{6}$)

Signa. One tablet three times a day will often bring relief.

In rheumatic patients:

℞	Pilocarpini hydrochloratis,	.12 gm. (gr. ij)
	Syr. gaultheriæ,	90.00 c.c. (℥ iij)

Signa. Teaspoonful night and morning.

A solution of adrenalin chlorid 1/1,000 injected into the Eustachian tube, and blown into the middle ear, is of value in relieving some forms of tinnitus (Dudley Reynolds).

Paresis and Paralysis of the Auditory Nerves. — This may be due to hemorrhagic extravasations, necrosis of the temporal bone, syphilis or trauma.

The *treatment* for paresis or paralysis of the auditory nerves depends upon the duration and cause of the disease. The general treatment consists in the administration of alteratives, rest in bed, hot foot baths, saline purgatives, or the application of constant current by means of the ear electrodes with negative pole to the ear, continued six or eight minutes as strong as can be conveniently borne.

Cerebral Cause of Deafness. — From the nature of the causes which may be emboli, gummata, encephalitis, etc., little in the way of treatment can be advocated. In the latter stage of the disease, if due to syphilis, iodid of potassium in large doses with pilocarpin will offer favorable results. After all treatment will be of little or no value.

Injuries of the Labyrinth. — Results from fall, blow upon the head, or penetrating wound.

The treatment is purely subjective, as no special line can be suggested.

Deaf-Mutism. — We have three classes of deaf-mutes:

1. Those who are congenitally deaf.
2. Those who have become deaf after birth and before acquiring speech.
3. Those who have become deaf after having acquired the faculty of speech to a greater or less extent. (Hovell.)

Some cases classed as deaf-mutes will be found to possess a considerable amount of hearing power.

TREATMENT. — The treatment consists in the careful search for the cause. Urbantschitsch recommends the following:

1. Exercise to awaken attention to acoustic impression.
2. Exercise to build up defective hearing.
3. Exercise to increase acoustic excitability.

The presence of catarrhal conditions of the nasal mucosa, post-nasal adenoids, or any disease of the middle ear, should be treated.

Hysterical Deaf-Mutism. — The treatment differs in no wise from that of hysterical deafness. General treatment for the building up of the nervous system, with mental suggestion, is indicated.

Simulated Deafness. — It is not infrequent that malingering cases come under the observation of physicians connected with great corporations or with the army.

A case of malingering deafness is reported, in which acuteness of hearing was quickly established by firing a pistol behind the head of the patient. The victim's fright soon established his deception. The stethoscope, by careful manipulation, may enable us to aim at a conclusion in regard to simulated deafness in one side.

Hummel has devised a scheme for detecting simulated one-sided deafness. He has a speaking tube fitted tightly into each ear. Then two persons with similar voices talk at the same time. They may use the same sentence, a slightly different sentence, or the word may be entirely different. The one-sided deaf repeat correctly what one person says, while the simulator will be confused.

Toxic Deafness. — Toxic deafness is due to the overdose of some drug, such as phenacetin, quinin, etc. Certain visceral conditions bring about more or less deafness sometimes disappearing spontaneously upon relief of the disease.

If in the labyrinth, deposits more or less affect the perceiving apparatus. If in the tympanic cavity the vascular changes demand only simple treatment.

TREATMENT. — Toxic deafness is so allied with inter-labyrinthian disease that the treatment is the same as for conditions observed under that separate head.

Metastatic Deafness is due to products of suppuration in some portions of the body being carried to the labyrinth or middle ear.

TREATMENT. — The treatment consists in palliative measures: stimulating free metabolism of the affected parts by the administration of iodid of potassium, Turkish bath and rest in bed.

Leukemic Deafness. — Leukemic deafness is due to the passage of the lymph corpuscles into the labyrinthian channels.

TREATMENT. — The treatment locally is of no recognized value. Absorption may be encouraged by the internal administration of iodid of potassium.

DISEASES OF THE NOSE.

Acute Rhinitis. — Acute rhinitis is an acute catarrhal inflammation of the mucous membrane of the nasal fossa, otherwise known as a cold in the head.

ETIOLOGY. — The cause of acute rhinitis is both predisposing and exciting. Among the many predisposing causes are to be mentioned inherited or acquired dyscrasia, occupation, unsanitary surroundings, imperfect clothing, woolen underwear, nervous exhaustion, malformation of the septum, uric acid diathesis and adenoids. Among the many exciting causes is the sudden and prolonged exposure of the body to draughts of atmosphere, dampness, sudden chilliness after violent exercise or after a Turkish *bath, exposure to* irritating gases, extension from a like condition of the pharynx and post-nares, and as advocated by some, the presence of pathogenic microörganisms.

PATHOLOGY. — The pathology of acute rhinitis is essentially the same as that characterizing acute inflammation of any other mucous membranes. There is a paralysis of the vaso-constrictor fibers of the capillaries, or an irritation of the dilator fibers, with swelling of the venous capillaries and lymph vessels, retention of glandular contents, which is followed by a reaction, extravasation of leukocytes, mucous, serous and lymph, with broken-down epithelium which is hastened by the previous distention of the cells. The discharge gradually changes from that of a serous to a mucous and then to a muco-purulent. If the sinuses are involved from extension of the inflammation, the muco-purulent character of the secretion may continue for a number of days. The general pathology varies considerably when abortive measures are successfully employed. The vessels, after four or five days, gradually regain their natural tonicity. Absorption of the exudation within the mucosa takes place and a return to the normal is observed.

TREATMENT. — The treatment resolves itself into curative and prophylactic. The curative treatment consists in the application of those agencies indicated for aborting the attack and the relief of the engorged Schneiderian membrane. If seen in the conception of the trouble, to abort the attacks, the local application of adrenalin chlorid to the mucous membrane, with the internal administration of suprarenal gland, five grains every three hours, and ten grains of Dover's powders at bed time, with hot foot-bath, may if not entirely aborting the attack, so mitigate it that subsequent treatment is made comparatively simple. The Turkish bath given once a day, when the patient can be confined to the house, restores normal equilibrium and is therefore a great curative agent.

The following is highly recommended:

℞	Ext. belladonnæ,	.008 gm. (gr. 1/8)
	Heroin,	.003 gm. (gr. 1/20)

Camphoræ,	.03 gm.	(gr. ss)
Quininæ bromidi,	.06 gm.	(gr. j)

Signa. One capsule every hour for four or five doses, afterwards one every three hours.

The application of adrenalin chlorid, 1/5,000 by means of spray every hour, will immediately relieve the engorged condition. This is followed by spraying the throat and nose with three per cent. solution of campho-menthol in albolene. Muriate of ammonia, internally in five- to ten-grain doses will stimulate expectoration, thus freeing the bronchi of exudations. While freeing the nose of secretions by blowing, it is necessary to remember the great danger of forcing mucus and pathogenic organisms into the Eustachian tube and middle ear. To avoid this the patient should be instructed to blow only one side of the nose at a time.

A disturbance of the equilibrium of the vaso-motor system may be due to digestive disturbance, uric acid diathesis, climatic conditions and improper clothing. The use of heavy woolen underwear predisposes to colds. It is best to have the patient change to mixed underwear or cotton. Silk underwear has only its delicacy of texture to commend it. Patients should be instructed to vary the weight of the outer clothing as far as possible with the change of the temperature. In gentlemen one style of color should always be adhered to. Elimination from the skin should be encouraged by systematic exercise. Cold sponge or plunge baths upon arising stimulate the superficial circulation of the body, which is often very sluggish. Obstructions within the nose must as far as possible be removed.

Simple Chronic Rhinitis. — Simple chronic rhinitis results directly from successive attacks of inflammation of the mucosa.

SYMPTOMS. — Patient complains of frequent susceptibility to catch cold. There may be more or less stenosis of the nose constantly complained of, with a hypersecretion of mucus. The nasal mucosa may become engorged at the slightest provocation, *causing sneezing* and prolific secretion of mucus.

TREATMENT. — The treatment is therefore both general and local. Chronic catarrhal rhinitis being due to some of the following causes, some form of gastro-intestinal derangement, irregularity in diet, sexual excitement, excessive use of heavy liquors, injudicious use of Turkish bath, imperfect ventilation of sleeping apartments, overheated offices and general debility, the general treatment is directed to the correction as far as possible of any of the above conditions, thus enabling the vaso-motor system to regain its normal equilibrium. For thoroughly cleansing the nose of secretions, which as the disease progresses, change from a watery fluid to a thick tenacious mucous and muco-purulent secretion, some solution of Dobell's is recommended. The patient should be given this solution with the instructions to use twice daily in Bermingham douche or spray, preferably before meals. The office treatment consists in applying, every other day, Dobell's solution as a cleansing fluid, followed by the application of some astringent in varied strength as the symptoms seem to indicate, spraying with one of the following:

℞	Zinci sulph.,	.06 gm.	(gr. j)
	Glycerini,	1.00 c.c.	(gtt. xv)
	Aquæ destill.,	30.00 c.c.	(℥ j)
℞	Zinci sulphocarbolatis,	.06 gm.	(gr. j)
	Glycerini,	1.00 c.c.	(gtt. xv)
	Aquæ destill.,	30.00 c.c.	(℥ j)

This is followed by spray of two per cent. solution camphomenthol in albolene. Massage[1] is highly recommended by Braun as a stimulant to the mucous membrane. When applied it is especially efficacious. This is again followed by albolene spray. Should the turbinated bodies fail to react to the treatment, surgical measures must be resorted to. Some recommend escharotics, others electric cautery, while others make a deep incision into the turbinals along the long axis of the bone, thereby causing great depletion, and sufficient cicatricial change to reduce the enlarged condition permanently.

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[1] See Massage.

Intumescent Rhinitis. — Intumescent rhinitis is a permanent tumefaction of the turbinated bones, more often involving the inferior. Upon the application of a probe, the spongy condition is at once apparent.

The submucous application of chromic acid by means of the Goldstein trocar and applicator, is highly recommended. Guarded puncture with the galvano-cautery is in many cases quite sufficient to reduce any tumefaction of the lower turbinals. Spraying with the following:

℞	Glycerol tannin,	4.00 c.c.	(ʒ j)
	Aquæ,	ad 30.00 c.c.	(℥ j)
℞	Zinci sulphocarbolatis,	.12 gm.	(gr. ij)
	Aquæ,	30.00 c.c.	(℥ j)

or the application, by means of a pledget of cotton and a probe, of ichthyol fifty per cent. or dusting the surface with stearate of zinc, will have a tendency to reduce the tumefaction.

After aqueous solutions are used, the nose should be sprayed with some hydrocarbon oil preferably two per cent. camphomenthol in albolene. Careful attention should be directed to the correction of any uric acid diathesis.

Hypertrophic Rhinitis. — A chronic condition affecting the mucosa of the turbinated bones causing more or less stoppage of the nose.

ETIOLOGY. — The cause of this condition is usually associated with successive attacks of acute coryza, in which there has been an unsuccessful return to the normal. Any irritation, local or constitutional, sufficient to keep the connective tissue of the submucosa distended for any length of time, will bring about the observed overgrowth of tissue. Thus digestive disturbances, climatic conditions, intemperance, sexual excesses, malformation of the septum, etc., are causative factors.

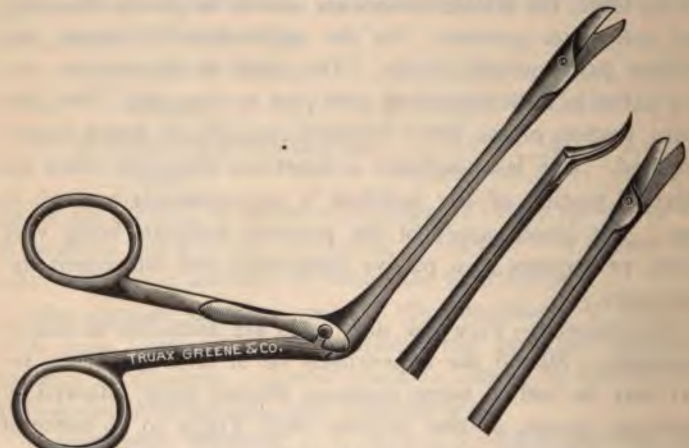
SYMPTOMS. — The prominent subjective symptoms are stoppage of one or both sides of the nostrils, sneezing, constant *blowing of* the nose, loss of resonance of the voice, prolific secretion of serum. The watery constituents may often evaporate and leave the secretions, over the surface of the nasal mucosa and post-nasal space, thick and tenacious. Olfaction may become impaired. In the objective symptoms, the lower and middle turbinated bones are observed to be fearfully distended at their anterior or middle aspect, pressing against the septum sufficiently to prevent seeing into the nasal fossæ. If not so large, the nodular masses are seen to be greatly distended and soft upon pressure. By the application of cocain, the swollen parts quickly recede. The color of the mucous surface varies in individuals from pale pink to deep red. The posterior portion of the lower turbinals may also be found hypertrophied. The last condition is sometimes observed, when the anterior portion of the turbinals is approximately normal in size. The blood supply of the posterior turbinals being very great, predisposes to a passive congestion and subsequent hypertrophy.

TREATMENT. — Very few such cases are amenable to simple treatment. Should the hypertrophy be of mild character, resort may be had to warm cleansing alkaline spray, followed by astringent sprays, as zinc sulphate three grains to an ounce of water, and this by campho-menthol two per cent. in albolene. By this method, the prolific discharge may be lessened. When the connective tissue deposits are the result of years of successive attacks of acute rhinitis, radical measures only are of value. This is done by the application of chromic acid, fused upon a probe, applied directly to the enlarged nodules, by electric cautery, cold snare, general surgical measures, or electrolysis.

In the milder form of hypertrophy of the turbinated tissue, without involvement of the bony structure, the application of fused chromic acid by means of the Goldstein turbinal trocar, to the deeper portion of the hypertrophied tissue, is highly recommended. This method of procedure is more efficacious and scientific than destruction by the local application of chromic acid, trichloracetic acid or galvanic cautery.

Surgical measures consist, as recommended by D. Braden Kyle, of making a V-shaped incision along the thickened overgrowth of the turbinated bones. This is removed by saw, scissors or snare loop. A portion of the bone is then removed by means of strong alligator-jaw forceps. The tissues are then approximated and held in position by splints of gauze.

FIG. 74.



HOLMES SCISSORS.

The Holmes scissors are of great value, and are especially recommended in the removal of hypertrophied conditions. They are very strong and easy of manipulation.

Turbinectomy, partial and complete, is very easily accomplished after securing complete anesthesia by the application of adrenalin chlorid for a short time, then followed by a four or five per cent. solution of cocain. The treatment recommended by Bryson Delavin, of passing a knife deep into the submucosa, and with a sweeping motion severing the intercellular tissue, is of great value. The knife is withdrawn without enlarging the opening. The hemorrhage is profuse for a few seconds. Contraction *without reaction* takes place, and relief is permanent. Regardless of the operations performed, the nose should be treated with alkaline and astringent sprays until the abnormal condition of the surface has passed away.

Climatic conditions as seen in the Mississippi Valley and in the region of the Great Lakes retard the normal progress of recovery. By electrolysis, very favorable results are reported, using the bipolar method with double electric needles. Passing a current of from five to ten milliampères into the tissues during a period of from two to five minutes is recommended by D. Braden Kyle.

Atrophic Rhinitis. — As the name implies, atrophic rhinitis is a condition of the mucous membrane and the turbinated bones, characterized by atrophic degeneration of the entire structural elements often extending into the pharynx.

Pathology. — The cause of atrophic rhinitis is still a disputed question. Bosworth maintains that atrophy results from purulent rhinitis in childhood, Gruenwald that the disease is permanently situated in the accessory sinuses, Boyer and Woakes that the disease is presumably of a neuropathic origin.

Symptoms. — The symptoms are conspicuous dilatation of the nasal fossa, partial or complete atrophy of the middle and lower turbinated bones. On the lower and post-nasal space may be observed thick muco-purulent slugs of tenacious and ill-smelling pus. The characteristic fetor observed in such cases is due to saprophytic infection. Two forms of the disease are observed. Those with and those without fetor.

Treatment. — The treatment which may extend over many years is often very unsatisfactory. The surface is first cleansed of the thick tenacious mucus which is more conspicuous in the post-nasal space, with a warm alkaline fluid in a post-nasal douche:

℞	Sodii biboratis,	
	Sodii bicarbonatis,	.60 gm. (gr. x)
	Sol. antiseptici (Lister),	3.75 c.c. (ʒ j)
	Ac. carbolici,	.18 c.c. (♏ iij)
	Aquæ destill.,	60.00 c.c. (℥ ij)

When the secretions resist the douche, resort must be made to probe and cotton for their removal. After thorough cleanliness is secured the surface, if there is any local pus infection, can be dusted with powdered stearate of zinc, to which is added sixty grains of orthoform to the ounce. Brown, Bishop, Braun and others report flattering results from massage. After the surface is thoroughly cleansed, Douglas recommends the application of ten or twenty per cent. watery solution of ichthyol, or four per cent. solution of ichthargon. Tampons of cotton, saturated with ichthyol or ichthargon, are allowed to remain in the nose for twenty minutes, sufficient time for absorption to take place. This is followed by oil spray. The treatment is administered every other day. General tonic treatment is usually indicated.

Edematous Rhinitis. — Edematous rhinitis may be acute or chronic. It is characterized by a watery infiltration into the connective tissue of the middle and inferior turbinated bones.

TREATMENT. — The treatment consists in scarification, application of four per cent. ichthargon and spraying twice daily with:

℞	Thymol,	.12 gm.	(gr. ij)
	Menthol,	1.00 gm.	(gr. xv)
	Albolene,	30.00 c.c.	(℥ j)

Any existing deformities in the nose must be corrected, likewise any constitutional dyscrasia.

Fibrinous Rhinitis is an acute inflammation of the mucous membrane of the nose more often seen in children, of a pathogenic origin, characterized by deposits of fibrinous material upon the surface. It should not be confounded with diphtheritic rhinitis. Pending bacteriological diagnosis, it is best to isolate the patient.

TREATMENT. — The treatment consists in the internal administration of chlorid of iron, in five- to fifteen-grain doses. The swollen condition of the turbinated bones may be reduced by spraying with a two per cent. solution of cocain. "The nose *should be sprayed* with warm alkaline solution, and the bleeding *points should be touched* with twenty per cent. solution of chromic acid, or ten per cent. argentum nitrate." For the prevention of the formation of fibrinous material the mucous membrane should be dusted with equal parts of stearate of zinc and trypsin.

Diphtheritic Rhinitis. — Diphtheritic rhinitis may accompany faucial infection or precede the infection. It is more often observed in children. Symptoms of the disease are a profuse, slightly fetid discharge from the nose, general debility, enlarged cervical glands, rapid pulse, slight elevation of temperature. The pseudo-membrane adheres to the mucous surface and upon removal leaves bleeding points. The Klebs-Löffler bacillus is always present. Albuminuria may also be present. Local palsies may follow as in faucial diphtheria.

TREATMENT. — The local treatment consists in irrigation with warm solution of Dobell's followed by dusting with trypsin. Antitoxin 1–500 c.c. should be injected, followed by the administration of chlorid of iron in fifteen-drop doses four times daily. Purgation should be encouraged by the hourly administration of calomel one-tenth-grain doses. The patient should be isolated.

Acute Dry Rhinitis. — Acute dry rhinitis is characterized by great turgescence with little or no secretion.

TREATMENT. — Hot fomentations across the bridge of the nose and over the eye afford great relief to the pain (Ballenger). The nose should be frequently sprayed with:

℞	Thymol,	.12 gm. (gr. ij)
	Menthol,	.36 gm. (gr. vj)
	Albolene,	30.00 c.c. (℥ j)

One tenth grain pilocarpin daily with free use of lithia water will stimulate the return of normal secretions.

Specific Rhinitis. — Specific rhinitis is a local manifestation of syphilis inherited or acquired. In the acquired following the infection of the nose, as in any other portions of the body, syphilis is characterized by three distinct stages, primary, secondary and tertiary.

The primary stage, or hard chancre in the nose, is seldom *seen*. *The* treatment consists in keeping the ulcer clean by use of hydrogen dioxid, followed by dusting with iodol or aristol with general tonic treatment.

In the secondary stage, the mucous patch is, as in the primary stage, cleansed with hydrogen dioxid, followed by the application of the solid stick of nitrate of silver. Some cases react to the gentle escharotic effect of carbolic acid. The constitutional treatment consists in the internal administration of mercury, preferably the bichlorid in one-fifteenth-grain doses or protoiodid one third grain, three times daily, or mercury by inunctions, which is more potent, pushing to the amount of tolerance, until ptyalism is produced or until diarrhea results, or tenderness of the teeth is observed. Mercury, in some form, should be administered for at least two years.

The tertiary stage, which is more often observed, is characterized by more or less structural changes, gummatous nodules, necrosis, etc.

The treatment consists in the administration of the mixed treatment:

℞	Kali iodidi,	1.30 gm. (gr. xx)
	Hydrarg. bichloridi,	.004 gm. (gr. $\frac{1}{16}$)
	Syr. sarsaparillæ,	3.75 c.c. (ʒ j)

Signa. To be administered well diluted.

The iodid must be pushed until the disease responds to the treatment. After cure of the local conditions is accomplished, we depend upon the mercury to eradicate the poison from the system. The local treatment consists in the careful removal of all crusts by irrigation twice daily with:

℞	Sodii bicarbonatis Sodii biboratis	āā .24 gm. (gr. iv)
	Ac. carbolici,	.12 gm. (gr. ij)
	Glycerini,	1.00 c.c. (gr. xvj)
	Aquæ destill.,	30.00 c.c. (℥ j)

If there is any necrotic tissue which cannot be removed by irrigation it must be removed by suitable forceps. The disagreeable odor can be disposed of by irrigating with the following every three hours:

℞ Potassii permanganatis, .12 gm. (gr. ij)
Ac. borici, 1.20 gm. (gr. xx)
Aquæ (tepidæ), 30.00 c.c. (℥ j)

Alcohol in any form is to be tabooed, nutritious diet is essential. Outdoor exercise, frequent baths, and warm woolen clothing are very necessary adjuncts to the building up of the system.

The treatment of congenital syphilis is aptly described by the "American Text Book of Surgery" and is copied herein.

"The principle of treatment being recognized, the routine procedure may be thus described: Give mercury as soon as the diagnosis of syphilis is assured, preferably in inunctions. Sir Benjamin Brodie's opinion, expressed many years ago, still represents that of the profession: I have tried different ways of treatment of such cases. I have given the child gray powder internally, and given mercury to the wet-nurse. But mercury administered to the child by the mouth generally gripes and purges, seldom doing any good, and given to the wet-nurse it does not answer very well, and certainly is a very cruel practice. The mode in which I have treated cases for many years past is this: I have spread mercurial ointment, made in the proportion of a drachm to an ounce, over a flannel roller and bound it about the child once a day. The child kicks about and, the cuticle being thin, the mercury is absorbed. It neither gripes nor purges, nor does it make the gums sore, but it cures the disease. I have adopted this method in a great many cases with signal success. Very few children recover to whom mercury is given internally, but I have not seen a case where this method of treatment has failed.

"When for any reason, as irritation of the skin, this cannot be employed, probably the best form of giving mercury by the mouth is the following formula:

℞ Hydrarg. cum creta, .06–.36 gm. (gr. j–vj)
Sacch. alb., .72 gm. (gr. xij)

M. Fiat, div. in chart., No. xij.

Signa. One powder three times daily to be taken soon after nursing.

"Iodid of potassium can be given separately in a syrupy solution in doses of a half grain to a grain, or if there are any marked tertiary symptoms, even in much larger doses, three to four times daily. The treatment of course should be continued long after the disappearance of the syphilitic symptoms, and it would probably be well to continue the mixed treatment intermittently until after puberty.

"The cases of visceral syphilis in very young children are generally fatal. Those who recover, do so in response to the active use of the above remedies."

Later, the prognosis is more favorable, and the treatment the same. Of course moist eruptions should be dusted with some astringent or absorbent powder, mucous patches should be cauterized or stimulated, and great attention should be paid to avoidance of source of cutaneous irritation by frequent changing of diapers, etc., but the general methods are the same as in the adult. The nose should be frequently sprayed with an alkaline spray, followed by the application of a two per cent. solution of yellow oxid of mercury or dusting with iodol.

Ozena. — Ozena is a symptom rather than a disease. It is very often an accompanying condition of atrophic rhinitis. The terrible stench which sometimes accompanies atrophic rhinitis is something beyond description. An ozenic odor may accompany syphilis, suppurative conditions of the sinuses, necrosis of the ethmoidal cells, the vomer, malignant neoplasms, etc. In all the cause of the symptoms must be searched for and eradicated. It is possibly a tropho-neurosis, produced by the ptomains or the microörganisms not yet differentiated. Cheval highly recommends cupric electrolysis. Insulated needles with the exception of the distal extremities are used.

The positive pole is passed into the mucosa of the lower part of the septum. Current from six to fifteen milliampères is used, sitting lasting from ten to fifteen minutes. Oxychlorid of copper is formed, by which the intercellular space is permeated and this is usually followed by healthy change. Whether oxychlorid of copper is a germicide Bayer, Javier and others fail to say. Each sinus should be carefully examined for some primary inflammation.

Citric acid in full strength or with equal parts of sugar of milk destroys the odor, does not irritate and lasts some days after the discontinuation of the powders (Hanine).

Lupus. — See lupus of the ear.

Glanders. — Glanders may be acute or chronic, usually attacking the mucous membrane of the nose, extending to the pharynx and larynx, characterized by the formation of numerous small ulcers in the submucosa due to infection with the bacillus mallei. Locally we have a rapid destruction of tissue by suppuration. The general symptoms are those of profound infection, usually terminating fatally.

Treatment. — The treatment though practically useless in the majority of cases consists in supporting measures together with antiseptic nose and throat douches and sprays (Lennox Browne).

Tuberculosis. — When observed in the nose it may be associated with pulmonary or laryngeal tuberculosis or may be independent. A small nodule or ulceration first characterizes the disease, due presumably to infection from the tubercle bacillus. The site of the lesion in the ulcerated form, according to Herzog is more often on the cartilaginous septum, which has a tendency to spread to the lip and accessory sinuses. The small red nodular growths bleed readily upon being disturbed. The disease may be confounded with syphilis or lupus.

When the disease is purely local the prognosis is good. The removal of neoplasms by surgical measures is at once [illegible] ted, followed by the application of lactic acid twenty [illegible] cent. solutions. The constitutional treatment c [illegible] ministration of cod-liver oil with iron and strychnin, nutritious diet and light exercise, change of climate—as to New Mexico—with this favorable results may be expected.

Anosmia. — Anosmia is a loss of smell due to either central, peripheral or functional disturbance of the nervous system.

TREATMENT. — When associated with insanity or hysteria, the affection is of minor moment, as the neurosis may disappear with the restoration of the mind to the normal condition (Brown).

When the condition is dependent upon hypertrophic or atrophic rhinitis, polypus or over-indulgence, treatment, both local and constitutional, may be of great value. Central lesions are seldom cured.

Parosmia and Hyperomia. — Parosmia and hyperomia is the perception of imaginary odors and the exaggeration of normal odors. It may be observed in the insane, hysterical or syphilitic.

TREATMENT. — The treatment is directed to the building up of the nervous system, and the treatment of constitutional dyscrasia.

Furuncle. — Furuncle is observed within the meatus, or on the outer surface of the nose. Such condition is due to staphylococcus infection usually within the hair-follicles.

TREATMENT. — The treatment consists in the application of camphophenique, which is of great value in relieving the pain and aborting inflammation. When pus forms it should be evacuated. For the relief of a forming boil, Brown recommends plunging a needle deep into the center. Small cilia involved should be extracted.

Epistaxis. — Bleeding from the nose may be observed at any age of life. In children it is suggestive of systemic disease. D'Astros mentions hereditary syphilis, either with or without local nasal lesion as the most frequent cause of epistaxis in children. In adults, the hemorrhage usually follows from varicose veins along the septum, produced by picking the nose, constitutional dyscrasia, exposure to irritating gases. Glass-blowers *very frequently suffer* from epistaxis.

TREATMENT. — Spraying the nose with adrenalin chlorid will, in the milder forms, arrest hemorrhage. If the hemorrhage is from an exposed vessel on the septum, it should be lightly touched with chromic acid fused upon a probe. Touching with the galvanic cautery will have a like effect. When the hemorrhage is from the post-nasal space deep packing with strips of bichlorid gauze soaked in albolene is indicated. The nasal gauze packer may be used to advantage in packing the cavity. Fluid extract of ergot, in twenty-drop doses every hour, with the patient sitting erect and head thrown back will arrest hemorrhage in mild forms of epistaxis, supplemented by ice bags to the nape of the neck. The post-nasal space may be plugged by means of the Bellocq cannula, or soft catheter. The plug should not be left in position longer than forty-eight hours for fear of septic infection. The plug, which may be made of sponge, cotton or lint, should be three quarters of an inch long and one half inch wide for an adult. It should be thoroughly sterilized before inserting. The catheter, to which a strong septic string is attached, or the Bellocq cannula, is passed along the floor of the nose into the pharynx, when the string from the cannula is brought forward through the mouth. If in the cannula of Bellocq, the movable rod which contains an eyelet, protrudes into the mouth, and can be threaded. The plug, oiled with carbol-vaselin, is then quickly but not too forcibly inserted, for fear of destroying the normal epithelium, drawn into position. It should not be introduced too tightly for fear of causing sloughing of the mucous membrane, or necrosis of the bone. If hemorrhage occurs after the removal of the plug the nares should be thoroughly cleansed before another is introduced, to obviate danger of sepsis (Bryant).

Hay-fever. — The causes of hay-fever may be divided into exciting and predisposing. Among the exciting causes first to be mentioned are the pollen of the ragweed and golden rod, which is observed about the middle of August. This is presumed to be inhaled, and from its presence on the mucosa excites the conditions known as hay-fever. [illegible] the *disease is of* a local origin or a tropho-ne [illegible] ble question. There is no doubt but that malformation in the nose, such as enlarged turbinals, deflection of the septum, spurs on the septum, hypersensitive areas of the mucosa, tend to excite this disease.

Rose-cold resembles hay-fever and is a form of hyperplastic rhinitis occurring in the month of June, the month of the rose, and is associated with the odor or dust of the rose.

Hay-fever is a very prevalent disease throughout the United States. In the northern portions, especially the White Mountains, northern Michigan and in the Adirondacks, there has often been observed an immunity from this disease. In certain portions of Canada, as in the province of Ontario and about the Great Lakes, for years past, there has been a complete immunity. During the past summer in this region the disease was prevalent and very severe. It will thus be observed that a permanency of immunity cannot be assured by climatic conditions.

Among the predisposing causes are malformation of the nose, uric acid diathesis, heredity, climatic conditions and social environments.

SYMPTOMS. — The symptoms of hay-fever, in the beginning, resemble an attack of acute coryza. There may be observed a slight elevation of temperature. Periodical attacks of sneezing greatly annoy the patient. The mucosa becomes engorged, causing difficult breathing, and great quantities of mucus are discharged by blowing the nose. In severe forms headache may be present, with general prostration. The eyes become congested and sensitive to the light. The symptoms may vary in individuals, from a mild attack to the severest form, with complications of asthma and even pneumonia.

PATHOLOGY.—The doctrine of nasal reflexes belongs to Hack. Since the promulgation of his theories, numerous investigators have been outspoken in regard to the neurotic origin of hay-fever. So to-day the consensus of opinion is that the disease is an affection of the vaso-motor system of a central or peripheral *origin.*

Sneezing is a reflex produced by some irritation upon the anterior sensitive area of the mucosa. It may follow as a result of the unequal swelling of the mucosa, caused by a vaso-motor paresis. The continued distention of the mucosa, from the exudations of serum, results in partial hypertrophy.

TREATMENT. — The treatment is both prophylactic and curative. It should be directed to the constitutional treatment of any existing rheumatic or gouty diathesis, or neurotic habit, the correction of any abnormal conditions found in the nose, and to the relief of the spasmodic attack. When there is a uric acid diathesis, lithia in the form of effervescing tablets, fifteen to twenty-five grains daily is highly recommended by Bishop.

Any conditions within the nose, as spurs on the septum, enlarged turbinated bones, polypi or local inflammation should be corrected. The hyperesthetic area must be sought for and cauterized by chromic acid upon a probe or the electric cautery.

For the neurotic temperament, Blaud's pills are recommended, one to be taken one hour after meals three times daily. Hemoglobin with arsenic is very beneficial as a general tonic. When there is a gouty or rheumatic diathesis, the following prescriptions are recommended by Ingalls. These should precede the attack from six weeks to one month:

℞ Liquoris potassii arsenatis, 4.00 c.c. (ʒ j)
Tinct. nucis vomicæ, 8.00 c.c. (ʒ ij)
Tinct. gentianæ
compos., q. s. ad 96.00 c.c. (℥ iij)
M. Signa. One teaspoonful in water after meals.

℞ Sodii arsenatis, .06 gm. (gr. j)
Ext. nucis vomicæ, .50 gm. (gr. vijss)
Ferri sulphatis, 3.00 gm. (gr. xlv)
Sodii carbonatis, 3.00 gm. (gr. xlv)
M. Fiat capsule No. XX.

Signa. One capsule after each meal, three times daily.

℞	Quininæ hydrobromatis,	2.00 gm. (gr. xxx)
	Sparteninæ sulphatis,	.50 gm. (gr. vij)
	Ext. hyoscyami,	.66 gm. (gr. x)
	Pulv. camphoræ,	2.00 gm. (gr. xxx)

M. Fiat capsule No. XXX.

Signa. One capsule every four hours.

℞	Liquoris sodii arsenatis,	32.00 c.c. (℥ j)
	Tinct. belladonnæ,	4.00 c.c. (ʒ j)

M. Signa. Five drops in water after meals, as a prophylactic measure.

℞	Zinci valerianatis,	.18 gm. (gr. iij)
	Asafetidæ,	6.00 gm. (ʒ jss)

M. Fiat. Capsule No. XXIV.

Signa. One capsule after each meal.

℞	Syrupi acidi hydriodici,	96.00 c.c. (℥ iij)

Signa. One teaspoonful after each meal three times daily.

The following preparation is beneficial where there is a history of a rheumatic diathesis. If necessary this could be given alternately with some one of the following prescriptions:

℞	Liquoris potassii arsenatis,	4.00 c.c. (ʒ j)
	Potassii iodidi,	6.00 gm. (ʒ jss)
	Vini pepsini, q. s. ad	96.00 c.c. (℥ iij)

M. Signa. One teaspoonful in water three times daily.

This combination is of value as a prophylactic measure and during the attack in rheumatic patients.

℞	Brucinæ phosphatis,	.18 gm. (gr. iij)
	Ext. hyoscyami,	1.00 gm. (gr. xv)
	Quininæ valerianatis,	4.00 gm. (ʒ j)
	Camphoræ,	2.00 gm. (gr. xxx)

M. Fiat. One capsule four times a day.

Dr. E. Fletcher Ingalls recommends the above prescriptions, which in his experience have seemed the most beneficial in warding off attacks. He also states that this combination is not only *advantageous in* delaying or preventing an attack but it seems to be of much value in mitigating the patient's suffering during its progress.

In the relief of the spasmodic attack spraying the nose with adrenalin chlorid immediately contracts the arteries of the mucous membrane. This should be followed by the application of aqueous solution of ichthyol fifty per cent. or campho-menthol in albolene.

Bishop, Gleason and others recommend nitro-muriatic acid, three to five drops, four times daily.

Asthma. — Asthma is usually an extension of the neurosis causing hay-fever, and is characterized by a spasm of the glottis and bronchi. Among the exciting causes of asthma, other than that accompanying hay-fever, are the inhalation of dust, from flowers, plants and animals, diseases of the upper air passages, climatic conditions and mental emotion. Among the predisposing causes may be mentioned hypertrophy of the turbinated bones, nasal polypi, enlarged tonsils and pelvic disease in women. The disease is often hereditary, manifesting itself in childhood. It is observed in the winter and spring as well as in the summer.

Pathology. — The pathology is still a matter of discussion. It is presumably a tropho-neurosis with a local hyperemia of the bronchial mucosa, with exudations of mucus.

Symptoms. — The attack is usually preceded by a number of premonitory symptoms, as headache, drowsiness, nervous depression and chilliness. The patient complains of nervous depression in breathing which increases rapidly, producing great anxiety of countenance and cyanosis followed by profuse perspiration. The spasm may last for a short time or pursue the patient through the night or a portion of the day. The spasm of the bronchial muscle is inspiratory in character.

TREATMENT. — The treatment is directed to the removal of any peripheral irritation, improvement of the nervous centers and the relief of the paroxysms. For the relief of the paroxysms injection of the following is recommended by Dr. Pepper:

℞	Morphinæ sulphatis,	.01 gm.	(gr. $\frac{1}{6}$)
	Strychninæ sulphatis,	.001 gm.	(gr. $\frac{1}{60}$)
	Hyoscyami hydrobromatis,	.0016 gm.	(gr. $\frac{1}{160}$)

The following is highly recommended by Mays:

℞	Phenacetini,	4.16 gm.	(gr. lxiv)
	Quininæ sulph.,	1.43 gm.	(gr. xxij)
	Ammonium chloridi,	5.85 gm.	(gr. xc)
	Pulv. capsici,	.26 gm.	(gr. iv)
	Strychninæ sulph.,	.065 gm.	(gr. j)

M. Make in thirty-two capsules and give as needed.

The phenacetin relieves the neurotic portion of the attack which is often very prominent. The quinin is antiperiodic. The ammonium chlorid is strongly expectorant and markedly relieves the congestion of the mucous membranes. The capsicum neutralizes the depressant effect on the stomach of the phenacetin, while the strychnin of course is the strongest general tonic with very powerful action upon the respiratory system.

The inhalation of the following may be advantageously employed:

℞	Potass. nitratis Pulv. anisi fruct.	āā 15.00 gm.	(āā ℥ ss)
	Pulv. stramonii fol.,	30.00 gm.	(℥ j)

Signa. Tumberful placed on a plate, light with a match and inhale fumes for ten minutes. Change of climate is often very beneficial.

Nasal Hydrorrhea. — Nasal hydrorrhea is characterized by a profuse watery discharge from the nose. Due to some vasomotor disturbance.

TREATMENT. — The general treatment consists in the correction of any constitutional derangement that might directly or indirectly influence the distention of the mucosa. The local edema may be treated with:

℞	Zinci sulphatis,	.12 gm. (gr. ij)
	Glycerini,	1.00 c.c. (gtt. xv)
	Aquæ destill.	āā 15.00 c.c. (ad ℥ ss)
	Aquæ cinnamomi	

This is followed by spraying the nose with:

℞	Camphoræ,	.06 gm. (gr. j)
	Menthol,	.24 gm. (gr. iv)
	Resorcin,	.12 gm. (gr. ij)
	Albolene,	30.00 c.c. (℥ j)

In many respects the treatment will be the same as that indicated for the relief of hay-fever.

Parasites. — Insects, flies, etc., may find lodgment within the nose and act as a foreign body or deposit their larvæ.

The symptoms are those of severe acute coryza, headache, bloody discharge from the nose, difficult breathing, rise of temperature. The accessory sinuses may become infected from the migration of the parasites into the sinuses. By thorough examination with a cotton-tipped probe under strong illumination, the mucosa having been previously cocainized, the diagnosis is quickly established.

TREATMENT. — Mechanical extraction is often necessary. Scheppegrell recommends filling the nose with warm oil followed by warm alkaline douche.

Rhinolites. — The treatment is the same as that for the removal of any foreign body.

Neoplasms of the Nose. — Morbid growths of this region are subdivided into non-malignant, malignant, mixed tumors and cysts. Non-malignant neoplasms include those tumors which are not presumably destructive to life, and have no tendency to recur after removal. Tumors of this character may have their origin in epithelial tissue, as adenoma, and papilloma or in connective tissue as angioma, fibroma, chondroma, lipoma, osteoma and myxoma.

Adenoma. — Adenoma may occur in the glands of the skin covering the nose or nasal orifice, but not within the nasal cavity because of the histological structure. The tumor is observed to be nodular in character and grayish-white in appearance.

The treatment consists in making a free incision into the tumor, complete evacuation of the contents, and the curettement of the sac.

Papilloma. — Papilloma may grow along the mucous surface. They are more often observed along the floor of the nose at the junction of the septum. The second variety, or hard papilloma, springs from the cutaneous surface and resembles a skin wart, observed about the meatus.

The treatment is generally surgical. If the growth is situated upon the mucous surface, it can be removed by the aid of the snare. To prevent subsequent hemorrhage and insure complete removal it is advisable to apply the galvanic cautery following the removal of the growth by the snare. The growth upon the cutaneous surface may be removed by small curved scissors or sharp knife.

Angioma. — Angioma is a tumor composed largely of blood-vessels, situated in the mucous surface, appearing as a circumscribed area or protruding mass. The color of the tumor and the tendency to bleed will suggest the character of the growth.

The treatment consists in the removal of the growth by means of cold snare or electro-needle.

Fibromas. — Fibromas resemble connective tissue in their structure and have their origin in the submucosa. The usual site of origin is the posterior and inferior portion of the middle turbinated bone. The tumor may grow to be very large. The growth is presumed to result from some traumatic irritation.

The *treatment* recommended is the prompt removal of the growth by means of the cold snare.

Chondroma, as the name implies, is a growth resembling cartilage in histological structure. The site of origin is the septum.

The treatment is directed to the removal of the hard nodular mass by means of the electric drill or Holmes saw. Sometimes the growth may be removed by means of a short narrow knife. The after treatment consists in the application of ichthyol fifty per cent. to stimulate the cellular growth of the mucous surface.

Lipoma. — Lipoma may involve the anterior surface of the nose. The histological structure of the tumor is composed of fat with trabeculæ of fibrous tissue. The nose becomes very large, presenting an irregular surface. Lipoma is usually of a traumatic origin.

When the tumor is so situated as to permit of operative procedure, *treatment* consists in the partial enucleation.

Osteoma. — Osteoma is significant of a bony growth and may be observed growing from the bony or cartilaginous portion of the nose. Osteomata may take on the character of hard bony tissue, spongy or otherwise — a form of rarefying ostitis. The hard form may originate in the sinuses, press down upon the nasal cavity, or into the orbit, displacing the eyeball. The soft variety may spring from the turbinated bones or the cartilage wall of the septum. As a rule, they grow to a certain size and stop. The symptoms are usually those of increasing pain, due to pressure upon the nerve filaments. The situation of the tumor often prevents the removal. If accessible they may be removed by the aid of a saw and gouge.

Myxoma is a connective tissue growth, often observed in the nose. The general term of mucous polypi is applied to tumors of this kind. They are of a soft jelly-like mass, pedunculated, usually springing from some localized area of necrosis in the bony structure of the nose. They may be single or multiple in number. The symptoms are so distinct as to enable us to arrive at an immediate diagnosis.

The *treatment* is essentially surgical. The position of the peduncle may be so obscure as to make it quite difficult to remove. If the point of origin can be located, curetting and touching with the actual cautery or fifty per cent. solution of chromic acid will often destroy any remaining parts of the

Malignant Neoplasma of the Nose. — Growths of this character are destructive to life, giving off secondary and metastatic growths and have a tendency to recur after removal. Malignant growths are subdivided into carcinoma and sarcoma. *Carcinoma* is a tumor composed of epithelial cells and a vascular stroma originating in the mucous membrane. It has a tendency to spread by a process of branching. Sarcoma of the nose is usually found first manifesting itself in the connective tissue and gradually involving the mucous membrane. A number of varieties present and derive their prefixes from the character of the cells predominating, as round cells, spindle cells, giant or myeloid, mixed cells and alveolar sarcoma. Cohnheim advances the theory that sarcoma results from some disturbance of embryonic connective tissue. *Sarcoma* may be observed in infancy, while carcinoma is usually observed after middle life. Sarcoma may involve the bony structure of the nose as well as the intercellular tissue of the mucosa. The round-celled sarcoma are more frequently observed in the nasal passages. The diagnosis of suspected cancer is usually cleared up by a microscopical examination of a small section of the tumor.

The *etiology* of cancer is still clouded in darkness. The presence of bacteria in the inter-cellular spaces of cancer has caused many observers to associate them with the cause. Gaylord maintains that the presence of a protozoön in all cases may be the cause of cancer. There is a well-grounded belief in the parasitic origin of cancer. Fortunately cancer of the nose is infrequent. The growth is usually slow, infiltrating itself along the lymphatics. The situation of the growth may be within or without the nose. The tendency is to spread slowly, destroying a portion or the whole of the nose, with the involvement of the greater part of the face. Fortunately the patient succumbs early to the ravages of the disease. Cancer is usually so far advanced before the patient seeks advice, on account of the usual absence of pain, that the case is seldom seen until too late to remove *the growth in toto.* The natural tendency of the growth is to *irregular ulceration.*

TREATMENT. — The treatment of cancer is essentially surgical. Heroic and radical operative procedure is indicated in the early inception of the disease. After it has progressed to any great extent operative procedure rather hastens the progress of the disease. A favorite prescription of Roswell Park's is:

℞	Hydrarg. iodidi rubri,	0.52 gm.	(gr. viij)
	Auri chloridi,	1.55 gm.	(gr. xxiv)
	Arsenici bromidi,	3.00 gm.	(gr. xlviij)
	Potass. iodidi,	0.65 gm.	(gr. x)
	Acidi nitrohydrochl. dil.,	9.37 c.c.	(ʒijss)
	Aquæ destill.,	ad 444.00 c.c.	(℥xv)

Give X. M. Tid.

In inoperable cases the patient should have the advantage of a thorough and intelligent application of the X-ray.

Coley of New York reports the cure of a number of cases of sarcoma and carcinoma with the toxins of erysipelas in combination with the toxins of the bacillus prodigiosus. A number of years ago Fehleisen reported favorably upon the results of inoculating sarcoma and carcinoma with a culture of the erysipelas coccus. Since that time Spronk and Coley have further investigated the effects of the inoculation of cancer with the erysipelas coccus with the result of curing a number of cases.

Methylen blue five grains to the ounce, and Fleming's solution of osmic acid applied locally or injected into the cancerous tissue are both highly recommended for the treatment of cancer.

Mixed Tumors. — By this term is implied those forms of tumors which are both malignant and non-malignant, or a combination of the two varieties of cells, as adeno-carcinoma, myxofibroma and teratoma.

Cysts. — Cysts are pathological cavities provided with a distinct membrane enclosing fluid or semi-fluid contents (Hektoen-Riesman). Among those observed in the nose are retention cysts (mucocele) cystoma and dermoid cysts.

The *treatment* of tumors of this character consists in the evacuation of the contents with partial removal of the cyst wall.

Foreign Bodies. — Foreign bodies are usually placed in the nose by children, the insane or hysterical. When the foreign body is small it may be dislodged by placing the mouth of the operator over the mouth of the child and forcibly blowing. Foreign bodies can as a rule be easily extracted with narrow goose-necked forceps, after the mucosa has been anesthetized and shrunken by the application of four per cent. solution of cocain.

The Bosworth nasal forceps or alligator forceps may aid in extracting the substance. The author has often used a cystotome with success. Partial anesthesia is often necessary to facilitate the extraction. As a rule, the anesthetic effect of cocain is all that is necessary. Even when chloroform narcosis is necessary, it is best to proceed by the cocainization of the nose to reduce the swollen mucous membrane.

DISEASES OF THE SEPTUM.

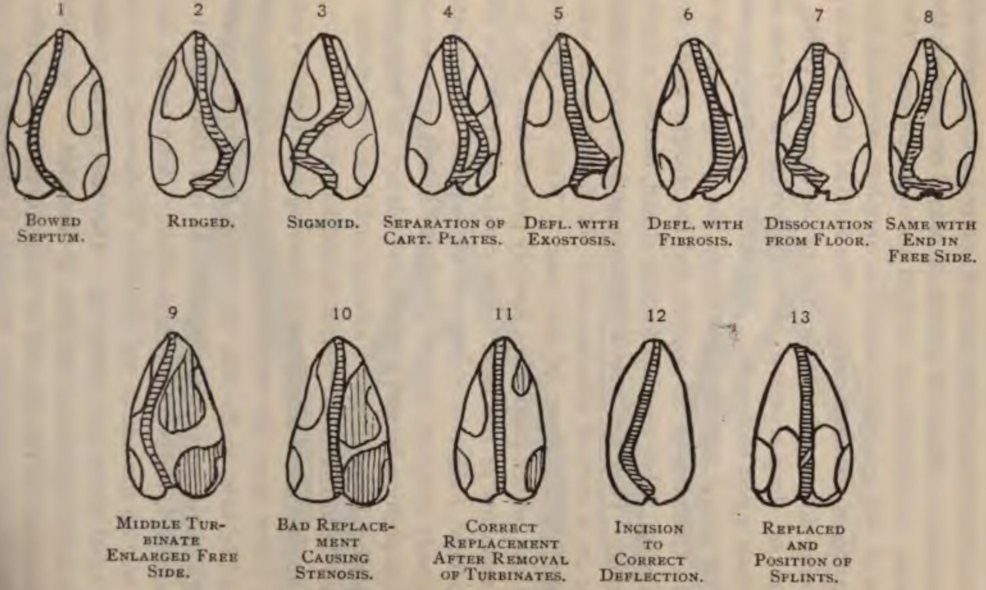
Deflection of the Septum. — Deflection of the septum is more often of a traumatic nature, and is due to falls upon the face in infancy, blows upon the nose, accidental and otherwise, at some time in youth. Inherited syphilis predisposes to deflection of the septum. In childhood, abnormal growths of the middle turbinate bones may force the septum to one side. Deformities of the septum have been frequently observed in criminals.

The illustration (Fig. 74) of the deformities of the septum is shown through the courtesy of Dr. H. Beaman Douglass.

Treatment. — There is more or less latitude in regard to our choice of surgical procedure. In many cases of deflection with exostosis, sawing away of the growth will sufficiently restore breathing space.

Should the deformity be anterior, with a separated septum, *splitting the cartilage* with a knife, and the removal of a sufficient

FIG. 75.


1
BOWED SEPTUM.
2
RIDGED.
3
SIGMOID.
4
SEPARATION OF CART. PLATES.
5
DEFL. WITH EXOSTOSIS.
6
DEFL. WITH FIBROSIS.
7
DISSOCIATION FROM FLOOR.
8
SAME WITH END IN FREE SIDE.
9
MIDDLE TURBINATE ENLARGED FREE SIDE.
10
BAD REPLACEMENT CAUSING STENOSIS.
11
CORRECT REPLACEMENT AFTER REMOVAL OF TURBINATES.
12
INCISION TO CORRECT DEFLECTION.
13
REPLACED AND POSITION OF SPLINTS.

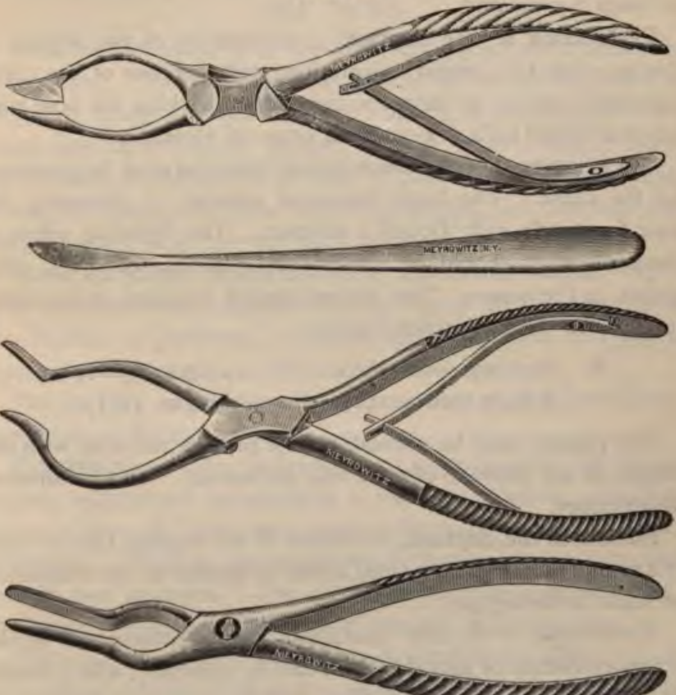
DIAGRAMS REPRESENTING FORMS OF DEFLECTIONS OF NASAL SEPTUM AND OPERATION FOR ITS CURE.

amount to allow the cartilage to collapse, is all that is necessary. The subsequent treatment is directed to keeping the parts in contact with the hard-rubber splits or gauze packing, until adhesion is complete. When the septum is ridged or sigmoid, the Asch opening is inferior to no method we might pursue. The technique of this operation consists in complete anesthesia following irrigation of the nasal cavity. The head of the patient is placed inclining downward over the edge of the operating table. With a blunt or sharp separator, the adhesion of the septum and the turbinals is first broken up. The Asch septum scissors are now quickly passed into the nasal cavity, the triangular blade resting in the concavity of the septum and the straight blade over the convexity. They are then forcibly closed, making a button-hole incision. They are now withdrawn and a second incision is made in a vertical direction over the first incision, which was parallel to the floor of the nose. With the finger in the nose the convex portion is forcibly pushed into line, breaking the segments at the base. The compression forceps are now introduced further to strengthen the septum. Immediately the previously sterilized rubber splints are forced into the nose and held in position by strips of adhesive plaster, the nose is sprayed by sterilized iced Dobell's solution and bichlorid solution. The patient is instructed to remain in bed four days.

The subsequent treatment is spraying with Dobell's iced solution every hour for twenty-four hours. Cold ice compresses should be kept on the nose for twenty-four hours after the operation. Cold spray and applications not alone guard against hemorrhage, but prevent inflammation. After twenty-four hours the tube on the side of the concavity is removed, after cleansing the nasal cavity and sterilizing. The tube is then reinserted. After forty-eight hours the tube is discarded. The tube on the convex side of the septum is removed after forty-eight hours, sterilized and reinserted. This tube is sterilized daily and worn *for one* month. Results are as a rule satisfactory. A few cases *of septic infection* following this operation have been reported.

Collapse of the Nasal Alæ is more often due to injury of the nose during infancy. Narrowing of the nose may follow mouth breathing. A short perforated silver tube which is worn at night only is highly recommended by D. Braden Kyle.

Fig. 76.



Asch Instruments.

Ulceration of the Septum. — This is not an uncommon condition and may be followed by perforation. It is more often seen in the mucous membrane overlying the cartilaginous septum due to infection from picking the nose and is observed more especially in syphilitic patients.

Treatment. — The ulcer should be carefully cleansed wi hydrogen dioxid followed by spraying with Dobell's solution. After thorough cleansing, the ulcer should be touched with solution of nitrate of silver, twenty grains to the ounce. Application of an unguentum of yellow oxid of mercury, ten grains to the ounce, with systematic treatment which in a great majority of cases is indicated.

Perforation of the Septum. — Perforation of the septum is due as a rule to a primary ulceration, with necrosis of the cartilage from specific or traumatic infection. Picking the nose with infected finger nails is a common cause of ulceration.

Treatment. — The constitutional treatment must be governed by the cause. The local treatment consists in cleansing the nose frequently with Dobell's solution. The bleeding edges of the perforation should be cauterized by nitrate of silver, sixty grains to the ounce. The patient should be given an ointment to apply to the perforation such as:

℞	Hydrarg. oxidi flavi,	.24 gm. (gr. iv)
	Adepis benzoinatis,	30.00 gm. (℥ j)

The patient must be warned against picking the nose with the fingers in an effort to remove the excretions. The perforation never closes.

Edema of the Septum. — Edema of the septum may be seen at any age of the patient, and is due to trauma or the inhalation of some irritating gas.

Treatment. — It may disappear by the absorption of the serous exudation or may demand relief by puncture, which should be followed by the application of fifty per cent. solution of ichthyol upon cotton, the cotton to remain in the nose for twenty minutes.

Abscess. — Abscess of the septum may be acute or chronic, involving the submucosa, often extending to the perichondrium. The usual cause of abscess is usually some form of infection from trauma or metastatic infiltration.

Treatment. — The treatment consists in both cases of making a free incision into the abscess, followed by flushing with hot antiseptic solution. The wound should be kept open with sublimated gauze.

DISEASES OF THE ACCESSORY SINUSES OF THE NOSE.

Such conditions are more prevalent in children and adults than is supposed. Many cases are overlooked and never diagnosed as such. It is now apparent that the majority of people suffer from some form of sinusoidal disease. Harke reports that in thirty post-mortem examinations of cases of croup, measles, diphtheria, whooping cough, scarlatina and chicken-pox, not one was free from suppuration in the accessory nasal cavities.

Acute Catarrhal Inflammation of the Frontal Cells. — This is a very frequent condition usually caused by the presence of the bacillus of influenza, or some exanthematous disease, as measles, scarlet fever and diphtheria.

The exciting cause is usually an extension of an inflammatory condition of the nasal mucosa.

Symptoms. — Pain, unilateral, and bilateral, over the frontal region, aggravated by assuming a stooping posture, coughing, desire to blow the nose, nasal tone in the voice, are characteristic symptoms. More or less congestion of the nasal and conjunctival mucosa may be noted. The discharge from the cells is at first a thin stringy mucus, which quickly becomes muco-purulent.

TREATMENT. — The treatment is directed to the cleansing and reducing of inflammation of the nasal mucosa, spraying the nose with adrenalin chlorid 1/5,000, followed by spray of cocain which will often relax the congested mucous membrane and cause evacuation of the exudation within the frontal cells. Warm footbath at bed time with ten grains of Dover's powders internally to the adult followed by a saline upon rising may be administered, when the inflammation is acute. If the disease persists for any length of time, the administration of those drugs which tend to stimulate elimination are indicated, such as sodii benzoate in ten-grain doses three times daily. Topical application of warm irrigation and sprays of hydrocarbons should be frequently used. Tampons of cotton dipped in ichtholdin is efficacious, if placed far up into the nasal cavity. Turkish baths, where there is no chance of exposure, are of great value. Surgical measures may be demanded for the removal of hypertrophy of the middle turbinated bones, deviation of the septum, etc.

Chronic Catarrhal Inflammation of the Frontal Cells. — As a rule chronic catarrhal inflammation of the frontal cells results from successive attacks of cold, from exanthematous disease or polypi. Any foreign body, tumor or hypertrophy which may obstruct the exit-canal, may produce the disease. There may be slight tenderness over the frontal region.

TREATMENT. — The treatment is directed to the removal of any possible local obstruction. The passage of a blunt silver cannula into the infundibulum may encourage free drainage. Tampons of cotton saturated with ichtholdin are highly efficacious. They should remain high up in the nasal cavity for fifteen minutes to one half hour. Hot antiseptic cleansing solution should be prescribed for frequent home use. The cells should be frequently irrigated with Dobell's solution through a Hartman cannula.

Acute Purulent Inflammation of the Frontal Cells. — Acute purulent inflammation of the frontal cells occurs from an obstruction of the naso-frontal duct due to inflammatory swelling of the mucosa. The mucous exudations, within the sinuses, become infected with pathogenic organisms and rapidly change into pus.

SYMPTOMS. — The diagnostic symptoms of this condition are pain of a throbbing character in the frontal cells with discharge of an offensive muco-purulent pus from one or both sides. The diagnostic lamp pressed into the angle of the nose and eyebrows often shows a typical shadow indicative of retention of pus.

The disease may end spontaneously or may develop into a *chronic condition.*

Treatment. — The treatment is directed to encouraging free drainage from the cells, by the removal of any obstruction about the ostium. The swollen mucosa may be reduced by spraying with one per cent. solution of cocain. Accumulations of mucus should be washed away by a warm antiseptic spray, directed to the region of the frontal cells. With the mucosa retracted, frequent blowing of the nose may encourage the evacuation of retained secretion. Should the purulent secretion remain active for a few days, the cells may be catheterized and flushed with a warm antiseptic solution.

Free purgation should be encouraged in the beginning of the attack by the administration of two grains of calomel in the adult at bed time, followed by hot saline cathartic upon rising. The hygiene of the patient should be looked after as a prophylactic measure against subsequent attacks.

Chronic Purulent Inflammation of the Frontal Cells. — Chronic purulent inflammation of the frontal cells is more often due to an acute inflammation of the same character. The predisposing causes of the retention of pus and prolonged infection is a hypertrophic inflammation of the mucosa or growths within the nose, which prevent free drainage of the cells. The disease may result from a chronic purulent inflammation of the ethmoid cells.

Symptoms. — The symptoms are those of pain and great distress in the frontal cells aggravated by cold or damp weather. A purulent discharge which is yellow in character and varying in quantity may be noted. The electric illuminator of Heryng will often clear up the diagnosis.

Treatment. — The treatment is essentially the same as that for acute purulent inflammation or chronic catarrhal inflammation. When results are unsatisfactory, surgical measures are especially indicated. Bryan's operation is opening into the frontal cells under the margin of the supra-orbital ridge. The flap and periosteum are elevated and with a small trephine an opening made into the cells. Any necrotic bone must be removed. T cavity is flushed with some antiseptic solution and the wound closed with interrupted suture. A self-retaining drainage tube is sometimes necessary. The cavity should be flushed through a curved cannula, with antiseptic solution, until healing is accomplished.

Mucocele of the Frontal Cells. — This is a condition resulting from a prolonged catarrhal inflammation within the sinuses. The presence of mucous cysts is often difficult of diagnosis.

SYMPTOMS. — The symptoms are those of chronic catarrhal inflammation and weight over the bridge of the nose and frontal cells. The cyst containing muco-serum may undergo degeneration with the formation of pus, which escapes through the frontal canal. Unless there is spontaneous rupture, the treatment is that for empyema of the frontal cells.

Foreign Bodies of the Frontal Cells. — Foreign bodies in the frontal cells may be animate or inanimate.

TREATMENT. — If inanimate, the treatment is essentially surgical. If animate bodies are within the cells the treatment is that for suppurative inflammation, flushing the sinuses through Hartman cannula with a weak antiseptic solution.

Tumors of the Frontal Cells. — As in other portions of the body, malignant or benign growths are occasionally found. They may be local in origin, or extend from adjacent structure. Those belonging to the malignant class are sarcoma, carcinoma and mixed tumors. The destruction of tissue from such disease is usually very great, terminating unfavorably.

Among the non-malignant or benign tumors are fibroma, myxoma, osteoma and cyst.

TREATMENT. — The treatment of these tumors is directed to their partial or complete removal, which is in a manner indicated by their size and character.

Acute Inflammation of the Ethmoid Cells. — Acute inflammation of the ethmoid cells is usually associated with acute rhinitis and results from an extension of that disease. It may be associated with scarlet fever, typhoid fever and influenza. The mucous lining of the cells becomes swollen and congested, followed by profuse serous exudation. If the drainage is not interfered with, the case usually goes on to resolution in a few days. Should the prolific discharge become infected it assumes the characteristics of pus.

CAUSE. — Acute inflammation of the ethmoid cells is due to the presence of some pathogenic microörganism, or obstruction of the ostium by inflammatory changes within the nasal mucosa.

SYMPTOMS. — There is present headache, pain about the orbit, generally acute coryza, pain in the region of the sinuses when stooping over, slight rise of temperature, with often mental dullness. When there is marked retention of muco-purulent secretion, the pain becomes excruciating and the patient becomes completely exhausted from suffering. The discharge from the cavities varies in character with the disease from a thin mucus to a thick creamy white pus. The disease may be unilateral or bilateral.

TREATMENT. — The treatment consists in the reduction of any swollen conditions of the mucosa and the relief of catarrhal conditions. The nose should be sprayed high up in the attic with a two per cent. solution of cocain followed by warm alkaline spray for cleansing. Frequent spraying with adrenalin chlorid 1/10,000 is especially valuable in promoting free drainage from the cells. The application of a weak solution of argentum nitrate to the mucosa of the middle turbinal will keep the mucosa retracted. Ten grains of Dover's powders should be given to the adult at bed time. This will tend to promote diaphoresis and lessen local engorgement of the mucosa.

Most cases of suppurative ethmoiditis are observed in their chronic condition and in consequence surgical treatment is at once essential. The ethmoidal cells sometimes become very much distended, pushing the orbital plate far out into the cavity and displacing the middle turbinate down into the nasal cavity, completely obstructing the anterior nares. Fistulous openings may be through the bony wall into the orbit, emptying near tl inner canthus. The suppurative process may involve the anterior cells and the bulla ethmoidalis or the entire pneumatic space.

The *treatment* is directed to cleansing the attic of the nasal cavity of polypi or granulations and hypertrophies of the lower and middle turbinals.

When the discharge continues after the palliative treatment, the anterior portion of the middle turbinate is cut through with a pair of strong scissors and removed with a cold snare. Complete anesthesia may be secured by the application of a four per cent. solution of cocain. Hemorrhage may be controlled by the application of adrenalin chlorid. The cells should be carefully examined by the aid of Myle's curet and any necrotic tissue removed. The cavity is dusted with aristol and packed with bichlorid gauze. The after treatment consists in the daily irrigation of the cavity with warm antiseptic solution until recovery.

Chronic Inflammation of the Ethmoidal Cells. — This condition may result from successive attacks of cold. The fact that the great majority of people suffer from acute inflammation of the ethmoid cells, predisposes to a chronic catarrhal inflammation. The majority of these cases remain undiagnosed, the patient receiving treatment for a chronic catarrhal inflammation of the nose. The pent-up secretion may become infected and result in suppuration. The secretion may flow freely down over the middle and lower turbinated bones, and from the evaporation of the watery constituents, thick crusts are formed along the floor, which are only removed by forceps. Accumulations of such crusts predispose to catarrhal inflammation of the nasal mucosa.

TREATMENT. — The treatment is directed to the removal of any nasal obstruction which may prevent free drainage of the attic, cleansing with Dobell's solution, tampons of cotton dipped in a ten per cent. solution of ichthargon or fifty per cent. ichthyol are applied to the attic of the nose for one half hour daily, followed by a spray of campho-menthol in albolene.

***Purulent* Ethmoiditis.** — Purulent ethmoiditis may be acute or chronic in character and is due to infection from pathogenic microörganisms. It may be unilateral or bilateral and may accompany a like condition of the adjoining sinus or occur independently. The pain in the acute form is often very severe and deep-seated, sometimes involving the entire face and eyeballs. Dread of light may be present. A slight or prolific discharge of pus is noticed, covering the middle turbinated bones. In many cases of cleansing the surface and watching closely, pus may be observed to exude seemingly from the middle turbinated bone. The discharge may be offensive in odor and may be seen under the middle turbinated bones or high up in the nose.

TREATMENT. — In the acute stage the treatment is directed to establishing free drainage. Tampons of cotton dipped in one per cent. ichthyol or in the following solution are highly efficacious in encouraging free evacuation of pus :

℞	Iodidi,	.60 gm.	(gr. x)
	Potassii bromidi,	1.20 gm.	(gr. xx)
	Glycerini,	30.00 c.c.	(℥ j)

The abscess may rupture spontaneously or the symptoms demand surgical interference. In the chronic form the anterior portion of the middle turbinated bone is removed, followed by careful search for the removal of carious bone and disease products within the cells. The wound should be irrigated daily with hot carbolic acid solution 1/500.

Catarrhal Sphenoidal Inflammation. — Catarrhal sphenoidal inflammation is subdivided into acute and chronic. It is more often due to an extension of an inflammatory condition of the nose and naso-pharynx. The sphenoidal cells appear at the third year of life, consequently not until after this period can we expect inflammation in this region.

PATHOLOGY. — The pathology of inflammation of [illegible] phenoidal cells varies in no wise from that of ethmo [illegible]

DIAGNOSIS. — Diagnosis is very difficult. O [illegible] of exclusion can we positively differentiate the [illegible]

SYMPTOMS. — The symptoms are those of dull weight in the back of the head with discharge of mucus into the post-nasal space.

TREATMENT. — The treatment is directed to the thorough cleansing of the naso-pharynx, followed by two per cent. solution of campho-menthol in albolene. Hot baths should be recommended with general tonics and avoidance of sudden climatic changes.

Chronic Catarrhal Inflammation of the Sphenoidal Sinuses. — The disease develops from a retention of inflammatory exudation within the cells. With a good illumination and probe the origin of the secretion may be defined. In all cases complicated with secretion it is well to remember the location of pus within the nose is no indication of the site of lesion. Mucus and pus are constantly in process of gravitation.

SYMPTOMS. — The symptoms, as in the acute stage, are obscure. Pain directed to the back of the head and post-nasal discharge are some of the symptoms noted.

TREATMENT. — The treatment is that for the acute form of the disease.

Empyema of the Sphenoidal Sinuses. — This may result from a chronic inflammation, the retained secretions becoming infected and undergoing suppurative change. Infection may be due to the bacillus of influenza, pnemococcus, bacillus typhus and streptococcus of erysipelas. It may also result from diphtheria or other infectious diseases, syphilis or tuberculosis.

SYMPTOMS. — The symptoms are varied in character. Dull or severe pain in the head, reflected to the occiput and radiating to the ears. Muco-purulent discharge is seen in the post-nasal space or may be found between the septum and the middle turbinated bones. Pain may be general or localized about the head, ocular symptoms may be present, hyperemia of the optic nerve and retina, and tenderness of the eyeball. When pus is confined in the sphenoidal sinuses great destructive changes in the adjacent *tissue may* result, the pus burying itself in any direction.

TREATMENT. — When the indication for opening the cells is present it is best done under local anesthetic, with a specially constructed gouge, followed by curettement and flushing with an antiseptic fluid daily until recovery results. When there is general involvement the symptoms will indicate the treatment. It will be necessary in the greater number of cases to remove the middle turbinated bone to gain entrance to the sphenoidal sinus. Irrigation of the sinuses through the ostium sphenoidale is as a rule very difficult and painful to patient for a very long time and devoid of any practical good.

Empyema of the Accessory Sinuses of the Sphenoid.[1] — The presence of such cells is usually discovered when disease in this region is diagnosed and operative procedure on the sphenoidal cells has failed to cure the disease. The close proximity of the accessory sinuses to the cell proper makes an operation simply an extension of that into the sphenoid cells.

Tumors. — Among those noted in this region are both malignant and benign. Those of malignant character usually end in death.

TREATMENT. — The treatment is essentially surgical.

Syphilis and Tuberculosis. — The treatment is more especially general than local. Any necrotic bone must be removed by curettement and flushing with antiseptic solution.

Mucocele. — This is a like condition of the frontal and ethmoidal cells.

The *treatment* is the same as that for the mucocele of the frontal and ethmoidal cells.

Acute Catarrhal Inflammation of the Antrum of Highmore. — Among the causes enumerated as producing this condition are coryza, dental disease, acute or chronic rhinitis, diphtheria, measles, scarlet fever and an extension of a like condition from the nasal mucosa. Infection may find entrance through the nasal alveolar process from disease of the teeth. Acute coryza, which obstructs the ostium by swelling of mucosa, may allow the air to be absorbed and a passing hyperemia of the endothelial lining results, followed by a serous exudation. This may soon be absorbed and the case end in spontaneous recovery or the secretion may become infected and result in acute purulent inflammation.

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[1] See Anatomy, page 44.

TREATMENT. — The treatment consists in relieving any swollen condition about the ostium maxillæ. This is best accomplished by freeing the nasal cavity of any secretions by means of alkaline spray, followed by the application of adrenalin chlorid and four to six per cent. solution of cocain. Tampons of ichtholdine, laid along the middle meatus and the floor of the nose, are beneficial. Cold applications to the antrum of Highmore are indicated in the early stage of the inflammation. Acetanilid and Dover's powders in five-grain doses at bed time will aid in aborting the attack. Opening the cavity may be necessary to establish free drainage.

Many cases make a spontaneous recovery, the secretions being absorbed, leaving the antrum however susceptible to subsequent attacks. It will often be noted that in the old, where the symptoms point to empyema of the antrum, upon opening will be found a straw-colored, thick tenacious fluid, free from any odor. With antiseptic irrigation these cases make a splendid recovery. The maxillary antrum being developed at birth very often becomes the seat of purulent inflammation, though but few cases are reported. When the serous exudation becomes infected purulency readily develops, which demands surgical measures for its relief.

Chronic Catarrhal Inflammation of the Antrum of Highmore. — This results from successive attacks of acute inflammation. The diagnosis is often very difficult. There may be pain in the antrum and tenderness along the upper jaw at the roots of the canine and bicuspid teeth. A clear tenacious fluid from the affected side of the nose may be discharged at intervals.

TREATMENT. — The treatment is directed to the removal of the *nasal obstruction* by opening through the alveolus and *establishing free drainage*, flushing with warm antiseptic solution and the *maintenance of* free drainage.

Ozena of the Antrum of Highmore. — Ozena of the antrum may be associated with a like condition of the nose. It follows from necrotic tissue within the antrum or from disease of the roots of the teeth.

TREATMENT. — The treatment is the relief, as far as possible, of the cause. Diseased teeth should be extracted or treated and any necrotic tissue in or about the antrum should be removed.

Acute Purulent Inflammation of the Antrum of Highmore. — The cause of acute purulent inflammation of the antrum of Highmore is more often an extension of infection or inflammation from disease of the teeth, acute coryza, purulent inflammation of the ethmoid sinuses, exanthematous disease and influenza.

PATHOLOGY. — The antrum of Highmore being covered with pseudostratified columnar ciliated epithelium containing goblet cells, with a vascular supply, is predisposed to extension of infection from the nasal mucosa, or the superior maxillary bone. The secretion following the venous congestion or active inflammation, may become infected by pyogenic organisms such as pneumococcus, streptococcus and bacillus of influenza. The disease may be found at any age of the patient. There is present a purulent discharge from the ostium maxillæ. There may be pain which is more or less severe in the region of the antrum, and often slight elevation of temperature. Should the ostium maxillæ become occluded great pain results from retention of secretion. Infiltration of the bony walls with pus may take place, spreading to the alveolar process, causing complete necrosis from the angle of the jaw to the median line.

TREATMENT. — The treatment is the same as for chronic purulent inflammation, which is considered under that head.

Chronic Purulent Inflammation of the Antrum of Highmore. — The characteristic symptoms of this disease are purulent discharge from the nares in the region of the ostium maxillæ, which is sometimes fetid, continuing or intermittent, from the diseased side, and is more profuse upon arising from sleep. The symptoms observed in acute inflammation may be found inten fied. Pain in or about the antrum is complained of, tenderness upon pressure in addition to the history of the case will aid in establishing the diagnosis. Transillumination by means of the diagnostic electric lamp is of great value in establishing the presence of pus. As a further aid to diagnosis of chronic purulent inflammation of the antrum of Highmore, the tuning fork "C" is advised by Kuyk. When the antrum is filled with fluid, the tuning fork placed over the antrum at the first and second molars will be indistinctly heard on that side or not at all.

TREATMENT. — The treatment should be essentially surgical whether the opening into the antrum is made through the natural opening, through the inferior meatus of the nose, under the anterior end of the lower turbinals, by means of the Krause trocar, by the removal of a molar tooth and opening through the alveolus, or opening through the canine fossæ, the local treatment is essentially the same, *i. e.*, freeing the antrum of any purulent or muco-purulent matter and products of an unhealthy condition. Frequent irrigation with a two to five per cent. solution of protargol is especially recommended. Dundas Grant highly recommends warm boracic acid solution or four per cent. solution of carbolic acid for irrigation. The dry treatment dusting antiseptic powder over the surface is very unsatisfactory. In old cases where the antrum is filled with polypi and granulated tissue, curettement with the Vaulkmann spoon is necessary. The length of time of treatment is variable. Killian reports the average time to bring about a cure as eighty-two and six tenths days. The treatment should continue until all foci of the infection are removed. The wound should be carefully packed with antiseptic gauze which should be removed at each dressing, until all evidence of suppuration has passed away.

Emphysema of the Antrum of Highmore. — Emphysema of the antrum of Highmore is an accumulation of fetid gas in the cavity due to decaying teeth. Some lesion of the teeth may indicate the cause and thus clear up the diagnosis.

TREATMENT. — The treatment is directed to the extraction of *the offending* tooth.

Foreign Bodies. — Foreign bodies may be animate or inanimate. Inanimate substances may consist of bullets, foreign projectiles from gunshot wound or injury, teeth, dentist's broken drills, etc. The animate bodies are insects or worms which subsequently cause a catarrhal inflammation.

TREATMENT. — The treatment in all such cases is symptomatic.

Mucocele of the Antrum of Highmore. — The symptoms are those of a confined inflammation resembling pus retention.

TREATMENT. — The treatment is directed to securing drainage and irrigation until healing is complete.

Tumors of the Antrum of Highmore. — Tumors of the antrum of Highmore may be malignant or benign. Malignant growths of the antrum are exceedingly rare, those present being usually due to extension from a like condition in the surrounding tissues.

Curtis reports one case of epithelioma of the antrum. In the case reported the growth was stimulated by the operative measures which ended in death six weeks following the operation. Cysts are frequently observed, as a result of chronic inflammatory changes in the mucosa.

TREATMENT. — The treatment will be suggested by the symptoms presenting. For the removal of non-malignant growths, the treatment indicated is that of opening the cavity, curettement and free drainage. When the tumor is diagnosed as malignant, the probabilities of a cure are very slight. As in the nasal cavity the malignancy is stimulated by operative procedure.

FRACTURE OF THE NOSE.

Under fracture of the nose will be considered those of the two nasal bones, the septum, nasal processes of the superior maxillary bone, ethmoidal and sphenoidal bones.

With the exception of the ethmoid and sphenoid bones, the cause of fracture is traumatic. Of the ethmoid and sphenoid in addition to trauma one may have contra coup.

the nasal bones and septum is more frequently observed, and is recognized by pain, swelling, crepitus and often deformity. Hemorrhage from the nose is often severe. The septum in a vast majority of cases is injured in all fractures of the nasal bones. The septum, under a good illumination, is seen to be bowed or turned. The usual site of the fracture of the septum is the anterior portion of the bony septum or the posterior portion of the cartilaginous septum. It may be partially or completely fractured at its base or split, completely filling the anterior nares. In a great many cases of fracture of the nose simple or compound infection may occur which may end in the formation of an abscess or even necrosis. Fracture of the ethmoid may follow from a blow or fall upon the face or head.

SYMPTOMS. — The symptoms are profuse bleeding from the nose, loss of smell, puffiness of the conjunctiva, pain in the ethmoidal region. In fracture of the sphenoid we may have sudden loss of sight from pressure upon the optic nerve, paralysis of the third nerve, pain in the back of the eyes and hemorrhage from the nose. The temperature is slightly above the normal. Should the pressure be very great meningitis usually follows.

TREATMENT OF FRACTURE OF THE NOSE. — The nasal cavity is anesthetized by four per cent. solution of cocain, irrigated with some mild antiseptic solution and carefully examined for any deviation. With a Rose elevator, the nasal bones and septum can be easily pushed into position. In many cases the Asch or D. Braden Kyle splint, can be used to advantage in holding the septum in position. The nasal fossæ should be dressed every twenty-four hours to prevent infection. Various deformities or fracture of the external nose should, at the same time, be corrected by manipulation. The tin or lead splint can be shaped to the nose and fixed in position by a strip of adhesive plaster.

Cobb's splint is especially recommended when pressure is only necessary on one side to keep the nose in position. During the first twenty-four hours, when it is necessary to pack the nose, the *nasal cavity* should be sprayed every two hours with Dobell's iced solution. Compresses dipped in cold bichlorid solution should be placed over the bridge of the nose for the first twenty-four hours following fracture.

Saddle Nose. — The correction of saddle nose by the injection of paraffin after the method of Gersuny is of practical surgical value. The paraffin or soft white vaselin is carefully sterilized and injected at a temperature of 100° F. Preliminary to injection the surface of the nose is cleansed as for any surgical operation. The syringe is also thoroughly sterilized. The sight of the injection can be anesthetized by injection of Slach's solution or two per cent. solution of cocain.

The syringe, previously warmed, is filled with paraffin and injection made beneath the skin. While the injection is in progress the nose should be molded to the shape desired. The nose is dressed at the site of the injection with collodion. There is little or no reaction to the injection. The paraffin becomes encapsulated. One or more injections may be necessary to secure perfect results.

DISEASES OF THE NASO-PHARYNX.

Naso-Pharyngeal Catarrh. — Naso-pharyngeal catarrh may be acute or chronic in character, usually involving the mucosa of the Eustachian tube.

PATHOLOGY. — The pathology of the naso-pharyngeal catarrh varies in no wise from that of acute or chronic inflammation of the nasal mucosa.

CAUSE. — Acute inflammation of this region may be due to an extension of a like inflammation from the nasal mucosa or oro-pharynx. The same exciting cause that produces acute rhinitis will produce acute naso-pharyngitis. Predisposing causes of naso-pharyngitis is the presence of Luschka's tonsils, anterior nasal obstruction, syphilis, dyspepsia, unhygienic surro
inhalation of irritating gases. Residents of the natur
gions are especially prone to this disease.

Symptoms. — In the acute form there is a dry swollen condition of the post-nasal space. There is a constant effort on the part of the patient to dislodge any accumulation of mucus. The patient also complains of a dry smarting sensation in the nasopharynx. After a few hours the vessels relax, which causes a prolific amount of secretion to be thrown out upon the surface. The secretion varies in consistency from a thin watery fluid to thick tenacious purulent matter. The temporary inflammation may extend to and involve the Eustachian tube, causing slight deafness. The odor of the breath from the infection of the secretion is often very offensive. The disease passes away under careful treatment, in from two days to a fortnight.

In the chronic form the secretion is usually thick mucus, which, accumulating in great quantities during the day and throughout the night, annoys the patient by a sensation of dropping into the throat.

Treatment. — In the acute stage the treatment is directed to cleansing the post-nasal space followed by a topical application of argentum nitrate, twenty grains to the ounce. A mild cathartic should be given at bed time. If seen early the disease is as a rule easily aborted.

The majority of cases which come under observation are chronic, and treatment under such circumstances is directed to the removal of any portion of Luschka's tonsils which may remain, the removal of nasal obstructions, correction of gastric disturbances, etc.

For securing absolute cleanliness, the following solution is recommended:

℞ Sodii bicarbonatis Sodii biborati Sodii chloridi	āā 8.00 gm. (āā ʒ ij)
Ac. carbolici,	2.00 c.c. (gr. xxx)
Glycerini,	15.00 c.c. (℥ ss)
Aquæ,	ad 300.00 c.c. (℥ x)

The silver post-nasal irrigator of Holmes is highly recommended for cleansing the post-nasal space with the above solution. This should be done twice daily, though as previously mentioned, solution continued for too long a time tends to act as an irritant.

In some cases remnants of Luschka's tonsils remain and act as a source of prolific secretions, demanding removal or destruction. For this the Gottstein curet or Cohen's post-nasal cutting forceps are necessary. Following operative treatment, astringent sprays or local application of astringent, preferably nitrate of silver in varied strength, as the case may require, are indicated. The following is highly recommended by a great many authorities:

℞	Iodidi,	.60 gm. (gr. x)
	Potassii iodidi,	20.00 gm. (gr. xxx)
	Glycerini,	30.00 c.c. (℥ j)

Signa. To be applied to the naso-pharynx with cotton applicator.

The following should be sprayed into the nose and throat after the application of astringents:

℞	Thymol,	.12 gm. (gr. ij)
	Menthol,	.30 gm. (gr. v)
	Camphoræ,	.20 gm. (gr. iv)
	Albolene,	30.00 c.c. (℥ j)

The palate retractor is often a necessary adjunct to therapy of this region.

Atrophic Naso-pharyngitis.[1] — Atrophic naso-pharyngitis is usually associated with a like condition in the anterior nares.

TREATMENT. — The treatment varies but little from that recommended for the relief of atrophic rhinitis. In resorting to the post-nasal irrigator great care should be taken in placing it behind the palate. On account of the dryness of the mucous membrane it is more easy to cause destruction of the epithelial cells than in moist forms of inflammation.

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[1] *See Pathology* of Atrophic Rhinitis.

The following is highly recommended as an alterative and tonic to the mucous membrane:

℞	Phosphorici,	.006 gm. (gr. $\frac{1}{100}$)
	Iodidi,	.008 gm. (gr. $\frac{1}{8}$)
	Bromini,	.008 gm. (gr. $\frac{1}{8}$)
	Vini Xerici,	4.000 c.c. (ʒ j)

(D. Braden Kyle.)

Caustic or strong astringents are contraindicated. Tincture of sanguinaria one drachm in glycerin one ounce, may be used as a local application.

Hyperplastic Naso-pharyngitis is an overgrowth of connective tissue covering the middle and especially the lower turbinated bodies causing post-nasal obstruction (D. Braden Kyle).

The treatment consists in the removal of the hyperplastic tissue by means of Cohen's or Clevenger's cutting forceps and irrigating twice daily with Dobell's solution.

Hypertrophy of the Lateral Walls (*Pharyngitis hypertrophica lateralis*) is an accompanying condition of chronic naso-pharyngitis. The lateral walls of the pharynx become distended from lymphatic infiltration, appearing as thick bands extending from the naso-pharynx down to and involving the posterior pillars.

The *treatment*, both local and constitutional, varies but little from that of chronic naso-pharyngitis.

The thickened bands are best destroyed by the repeated application of the galvano-cautery.

Post-nasal Adenoids. — In histological structure adenoids are true lymphoid tissue. Though Hans Wilhelm Meyer made the discovery of adenoids and their relation to deafness in children in 1868, only in the past twenty years has the profession, as a whole, come to a full knowledge of the importance of complete eradication of post-nasal adenoids in all suspected cases of interference with the functions of the post-nasal cavity. Among the conditions to be observed in children suffering from post-nasal adenoids is a marked change in the physiognomy. The nostrils become distended, mouth open, upper lips depressed, chin protruding and cheeks receding. Little or no air passes through the nasal cavity, in consequence mouth breathing becomes a necessity. At night the child snores loudly, being disturbed by dreams, night terrors and parched condition of the mucosa of the throat.

Progressive deafness which is not necessarily dependent upon great enlargement of the adenoids, is often the cause of the physician being consulted. The growth may be large enough completely to occlude the Eustachian orifice or produce occlusion by exciting a catarrhal inflammation.

Infection may find its way into the middle ear, producing acute purulent otitis media and mastoid inflammation. In consequence of the mouth breathing the red corpuscles are reduced in number, the vitality of the system is also reduced, predisposing the child to disease.

The teachings of Sir Felix Semon would have us believe that all adenoids do not demand removal, only those which we feel confident are producing or contributing to some pathological condition. Slight deafness is so prevalent in adults, and in the majority of such cases small remnants of Luschka's tonsils are to be found, is argument in a measure favorable to their removal when diagnosed.

It is presumed that adenoids undergo complete atrophy at the age of puberty. Their presence after this period of life is pathological.

DIAGNOSIS. — In addition to the ocular symptoms enumerated above, examination by the aid of the index finger, the mouth being held open by the mouth gag, is positive evidence of the presence or absence of adenoids. Examination in any other way is misleading and subjects the physician to a wrong diagnosis.

TREATMENT. — Local treatment consists in cleansing the post-nasal space with alkaline fluid followed by glycero-acid-tannic two drachms to an ounce of water, as recommended by Pritchar *Attention* should be given to building up the system by administration of the syrup of iodid of iron. Gymnastic and breathing exercises should be taught those old enough to follow instructions. Following removal of the growth, nasal breathing must be impressed upon the child.

Many times after the removal of adenoid growths the child will, through force of habit, continue to breathe through the mouth.

It is only possible thoroughly to remove adenoids by surgical measures. For this the Gottstein curet or Lowenberg's forceps are especially recommended. The choice of an anesthetic depends upon the individual case. In the adult, and occasionally in young children, a local anesthetic is all that is necessary. For children, the choice of an anesthetic may be nitrous oxid gas, ethyl bromid or chloroform and oxygen in combination.

The post-nasal space and nose should be irrigated with antiseptic and alkaline wash before proceeding to any surgical measures. The removal of adenoids by means of the finger is considered unsurgical, though a great many record good results from treatment in this way. Narcosis under ethyl bromid lasts sufficiently long to enable a dextrous operator with a Gottstein curet to remove the growth thoroughly and accompanying hypertrophic tonsils.

If the child is young it is held upon the lap of the nurse or assistant. The arms are held to the side by placing a sheet about the child. The head is held against the right shoulder of the nurse by the assistant, the mouth gag is then inserted and the anesthetic administered. The curet should be passed into the vault in the median line and in curetting be held firmly in the median line to avoid injury to the Eustachian orifice. If the patient is placed upon an operating table the head should hang down over the side.

The treatment immediately following the operation consists in *holding the head forward* and downward until consciousness returns. *Gargling* with iced Dobell's solution will tend to free the throat from accumulations and mitigate against hemorrhage. The subsequent treatment consists in spraying the naso-pharynx with warm Dobell's solution, followed by two per cent. campho-menthol in albolene until recovery is complete.

Hemorrhage following adenectomy is seldom of any consequence. It is advisable to remember that such conditions are possible, and plugging the post-nasal space may be demanded following the operation.

DISEASES OF THE ORO-PHARYNX.

Acute Pharyngitis. — Acute pharyngitis is an acute inflammation of the entire pharyngeal mucous membrane, due more especially to exposure to cold, from septic infection of the nose, extension of inflammation from the nose, gastro-intestinal catarrh or indulgence in alcoholic liquors.

TREATMENT. — The constitutional treatment consists in the administration of a saline cathartic. For the slight elevation of temperature, acetanilid in five-grain doses should be administered every three hours. The throat should be gently sprayed with Dobell's iced solution followed by the application of argentum nitrate in five per cent. solution to be repeated every twenty-four hours. Spraying the throat with adrenalin chlorid quickly relieves the hyperemia. Presswitz bandages may be advantageously used during the stage of invasion.

Pastilles containing red gum, potassium chlorate and cocain, are especially recommended for home treatment. Should the case be seen in its conception, an old remedy which has been very efficient in aborting the attack is:

℞	Acetanilidi,	.60 gm. (gr. x)
	Aconiti,	.24 c.c. (gtt. iv)

To be taken at bed time. Any lesion of the nose or gastro-intestinal tract which may be the predisposing cause of successive attacks must, in the interim, be removed.

***Subacute* Pharyngitis.** — The cause of subacute pharyngitis is usually some gastro-intestinal derangement, or constitutional dyscrasia.

TREATMENT. — The treatment varies in no wise from that recommended in simple chronic pharyngitis.

Chronic Pharyngitis. — Chronic pharyngitis is characterized by changes in the submucosa or glandular structure of the pharynx, due to successive attacks of acute pharyngitis, obstruction to nasal breathing, indigestion or excessive use of the voice. A catarrhal condition of the pharynx may result from chronic bronchitis, or tuberculosis of the lungs, not alone from the ptomains eliminated, but to the constant retching, coughing and expectorating.

TREATMENT. — The treatment consists in building up the general system. Elixir glycerophosphates of soda and lime, syrup of hypophosphites compound or compound wine of iodin in teaspoonful doses, three times daily, for a tonic may be given.

The local treatment consists in cleansing the pharynx and naso-pharynx with Dobell's solution, followed by the application of ten per cent. solution of nitrate of silver. It is observed that nitrate of silver, even in small doses, is not well borne in some cases. Resort may be had to protargol in twenty per cent. solution as a substitute. Glycerol tannin may be used. Should the excessive use of tobacco or liquor be the cause, the habit should be dispensed with. Treatment for any gastric derangement is highly necessary.

Follicular Pharyngitis. — Follicular pharyngitis is characterized by irregular swelling of the glandular structure of the pharynx. The papilla-like swelling may be single or coalesced, forming large elevations more often along the lateral walls of the pharynx. The exciting cause of follicular pharyngitis is excessive use of the voice, indigestion and bad hygienic surroundings.

TREATMENT. — Any nasal obstruction or elongated uvula should first be removed. The constitutional treatment consists in giving a brisk saline cathartic, followed by the administration of some tonic, as elixir calisaya, iron and strychnin or elixir glycerophosphate of soda and lime. The follicles can be touched with twenty per cent. solution of chromic acid. If they do not readily react the actual cautery must be applied. Varicose blood-vessels can be severed with the actual cautery. The cautery point must be heated to a white heat, care being taken to avoid undue destruction of surrounding tissue.

The local treatment consists in the application, by means of spray or cotton applicator, of mild astringents and stimulating remedies such as :

℞	Tinct. iodidi,	3.75 c.c. (ʒ j)
	Ac. carbolici,	1.90 c.c. (gtt. xxx)
	Menthol,	.24 gm. (gr. iv)
	Glycerini,	30.00 c.c. (℥ j)

The home treatment should consist in spraying the throat frequently with three per cent. campho-menthol in albolene. Any stomach or intestinal indigestion should be corrected by suitable treatment.

Rheumatic Pharyngitis. — Rheumatic pharyngitis may be acute or chronic and is a condition of uric acid in the blood producing a local manifestation in the pharynx. The constitutional treatment consists in the correction of the uric acid diathesis. For this, the Turkish bath, with the internal administration of sodium salicylate in three- to five-grain doses every two hours or until the physiological effect is noted, or the administration of sodium benzoate in ten-grain doses four times daily, is highly recommended.

Many mineral springs in this country possess virtue in the relief of this condition. The water from the springs at Martinsville, Indiana, have under the author's observation shown great virtue as curative agents.

The citrate of lithia, ten grains of effervescing phosphate of soda in an abundance of water, aids materially in freeing the blood of the uric acid condition. Effervescing phosphate and benzoate of soda in heaping teaspoonful doses is even more efficacious.

The local treatment consists in alkaline sprays to the throat followed by the local application of a mild astringent, as protargol in ten per cent. solution, followed by spray of one of the hydrocarbon oils. Orthoform lozenges will relieve the pain in the throat. The pain in the muscles of the neck may usually be removed by hot applications.

Atrophic Pharyngitis or Pharyngitis Sicca is a non-inflammatory condition presenting a pathological atrophy of the glandular structure of the mucous membrane. The pharyngeal wall has a dry glistening appearance.

Treatment. — The internal administration of those remedies which stimulate glandular secretions is indicated, as iodid of potassium in limited doses and phosphorus 1/100 grain. The throat should be sprayed with Dobell's solution; following this locally tincture of sanguinaria in glycerin is highly recommended. The following may be used as a spray three to four times daily:

℞	Ac. carbolici,	.65 gm. (gr. x)
	Tinct. iodi Tinct. aloe Tinct. opii	āā .60 c.c. (gtt. x)
	Glycerini,	q. s. ad 30.00 c.c. (℥ j)

The following used in nebulizer is very soothing and stimulating:

℞	Ol. cassiæ,	.36 c.c. (gtt. vi)
	Ol. eucalypti,	.72 c.c. (gtt. xij)
	Ol. gaultheriæ,	.72 c.c. (gtt. xij)
	Menthol,	.60 gm. (gr. x)
	Albolene,	30.00 c.c. (℥ j)

Any abnormal conditions found to exist in the nose and throat must be corrected. The object in all such cases of atrophic degeneration is rather to secure relief. The probability of a cure is in inverse ratio to the time of existence of the disease.

Acute Infectious Phlegmonous Pharyngitis. — Otherwise *known* as infectious phlegmonous pharyngitis.

The pathology of this disease is still in doubt, no one micro-organism so far having been named as causing the disease.

The symptoms characterizing this disease are sudden soreness of throat followed by swelling, difficult deglutition, pain in the throat, rapid rise of temperature (103°–104°) headache, with symptoms of general infection, coldness of the skin, clammy perspiration, dry tongue often followed by early collapse and death. The streptococcus pyogenes aureus is more often found in the greenish fetid pus discharged from the diffuse abscess. The urine contains albumin. The disease is of bacterial origin with an intense general infection at the outset.

The *treatment* consists in placing the patient in the best hygienic surroundings possible. The throat should be frequently sprayed with Dobell's solution. Suspected abscess should be incised and drained. With symptoms of septic infection anti-streptococcus serum should be injected. A gargle consisting of:

℞	Sol. antiseptici (Lister),	1.80 c.c. (gtt. xxx)
	Ac. carbolici,	.18 c.c. (gtt. iij)
	Glycerini,	1.20 c.c. (gtt. xx)
	Aq. menthol,	30.00 c.c. (℥ j)

Used every two hours will give great relief. Marked relief may also be experienced by the use of the Pressnitz bandage. Spraying the throat frequently with:

℞	Ac. carbolici,	.30 c.c. (gtt. v)
	Menthol,	.30 gm. (gtt. v)
	Ol. eucalypti,	.12 c.c. (gtt. ij)
	Albolene,	30.00 c.c. (℥ j)

Which acts as a local sedative and antiseptic. After relief of the acute symptoms the administration of some ferruginous tonic is indicated. Local treatment can be of little avail though we may try to relieve all prominent symptoms. If asphyxia is imminent, tracheotomy may be resorted to, although nothing must be expected from it except temporary relief (Max Thorner).

Erysipelatous Pharyngitis. — This condition results from infection of the pharyngeal mucosa with the streptococcus of erysipelas. The disease may extend from a similar condition of the nasal mucosa. Dry and burning sensation in the throat, high temperature with diffuse redness and formation of vesicles over the pharynx, difficulty in swallowing and sometimes delirium characterize the disease. It runs its course in from five to six days.

TREATMENT. — The treatment consists in the internal administration of iron in large doses, preferably the chlorid. Internally extract of suprarenal gland in five-grain doses is recommended. Locally spraying the throat with adrenalin chlorid 1/10,000 or ½ per cent. solution of cocain reduces the hyperemia and lessens the pain. Free purgation is essential in the very beginning of the disease. The patient should be isolated.

Gangrenous Pharyngitis is a circumscribed necrosis of the submucosa following some infectious disease, septic embolism or trauma with marked constitutional symptoms accompanying the disease.

The treatment is directed to combating general infection by supporting the strength with nutritious foods, stimulation by means of whisky and strychnin, controlling the pain by opiates. The local treatment consists in cleansing as far as possible, with solution of carbolic acid one per cent. followed by peroxid of hydrogen. Orthoform dusted on the surface will act as a germicide and local anesthetic.

Traumatic Pharyngitis. — When due to the presence of a foreign body the first act consists in its removal followed by antiseptic sprays and gargle. Smoking, use of alcoholic liquors or any habit which may tend to retard resolution should be corrected. When due to gases, etc., change of condition is necessary. The tissues of the nose and throat have a certain faculty of adjusting themselves to many forms of irritating gases. Locally to relieve the pain of scalds, burns, etc., there is nothing better than smearing the parts with carbolized vasolin to which has been added four grains of menthol to the ounce (*D. Braden Kyle*).

Hemorrhagic Pharyngitis. — Hemorrhagic pharyngitis is an acute or chronic condition characterized by minute or confluent hemorrhagic spots. The disease is seen especially in those with hemorrhagic diathesis.

TREATMENT. — The treatment in both conditions is rather unsatisfactory. It consists in the correction of any constitutional diathesis with the local application of mild astringents. Any varicose vessels should be destroyed by the actual cautery.

Gouty Sore Throat is a chronic inflammation of the pharyngeal mucosa, a local manifestation of a uric acid diathesis.

The treatment as in hemorrhagic pharyngitis is essentially constitutional. Lithia water and preparations of lithia are highly recommended. The Turkish bath, exercise, massage, colchicum and iron all exert a beneficial influence.

Acute Uvulitis. — This condition makes its appearance very suddenly. The uvula becomes elongated and very much distended with serous exudations. While the author was in Cuba, with the army of occupation, it was not an unusual occurrence for the soldiers to report at morning sick call with this condition, with history of having retired free from any irritation of the throat.

TREATMENT. — Multiple punctures with sharp bistoury may be indicated if the edema is very great, followed by astringent gargles. Local treatment consists in gargling the throat with an equal part of alcohol and hot water every hour, closing the nostrils in the act of gargling. The irritating symptoms under this therapy pass away in a few hours.

Ulceration of the Uvula is a circumscribed solution of continuity of the mucosa, usually from a chemical irritation or constitutional dyscrasia. A low form of infection is usually present. The ulceration is more often situated upon the posterior wall.

TREATMENT. — If single ulcer presents, the treatment consists in warm alkaline sprays to the post-nasal space followed by nitrate of silver in solid stick.

Relaxation of the Uvula. — Treatment consists for a few of warm astringent gargles followed by the amputation of the elongation if indicated.

Pharyngitis Seu Angina Ulcerosa or ulcerated sore throat from a bacterial origin.

TREATMENT. — The treatment consists in the administration of iron and quinin in large doses with nutritious food. The local treatment consists in spraying the throat with equal parts of hydrogen dioxid and witch hazel, followed by the application of nitrate of silver forty grains to the ounce.

Urticaria of the Pharynx. — Merx reports a chronic case and Packard reports two cases, recommending for local treatment three to four per cent. argentum nitrate and potassium bromid internally.

Diabetic Inflammation and Ulceration. — A local condition accompanying diabetes. Verdos makes mention of diabetic pharyngitis with symptoms of drying of the throat, difficulty of swallowing and tenacious accumulation of mucus. Local treatment consists in mentholized sprays and astringents, such as iodin, biborate of soda, etc. Freudenthal records one case of diabetic ulceration and recommends for treatment twelve and a half per cent. orthoform emulsion.

Tuberculosis of the Pharynx usually results from a similar condition of the lungs. Tubercle bacillus being not infrequently found in the nose in health (Jones), local infection is one of the probabilities.

TREATMENT. — The treatment consists in thorough cleansing, curettement if necessary, and local application of lactic acid after the method of Heryng. Cinnamic acid is reported to possess certain curative effects in tuberculosis. It may be given by the mouth or hypodermatically in one-tenth-grain doses dissolved in seven per cent. salt solution. Change of residence to New Mexico is often beneficial.

Lupus. — In addition to the curettement of the diseased tissue, acid gargles are especially recommended. Should edema *become great* tracheotomy may be necessary.

Syphilis. — Syphilis may be primary, secondary or tertiary. Infection in the primary stage results from abrasion of the surface from an instrument, kissing, etc. In the secondary form the lesion may be congenital or acquired. The congenital manifestation appears about four to six weeks after birth.

The tertiary signs of the disease may occur at any time after the seventh year following infection. Gummatous formations, ulcerations, tumors, ulceration of the mucosa with vast necrotic changes are some of the conditions observed.

The diagnosis of syphilis in any of the stages is to a great extent dependent upon a history of the case and the general condition followed by the quick response from the administration of antisyphilitic remedies.

TREATMENT. — The treatment is not different from that of syphilis of the nose.

Glanders. — This is an infectious disease due to the bacillus mallei, which is transmitted from the horse to man. The symptoms of glanders are the enlargement of the sublingual and submaxillary glands, rapid rise of temperature, general prostration, painful deglutition, often metastatic infiltrations, with symptoms of general pyogenic infection. The duration of the disease is seventeen days. On examination of the throat, in addition to the general systemic manifestation of the disease will be found a glassy yellow discharge flowing from the nose; over the pharynx and the nasal mucous membranes will be seen a red nodular eruption which soon ulcerates. The nose may swell and become greatly edematous. The discharge from the nose and throat becomes thick, yellow and offensive. On examination of the pus the bacillus mallei is found in profusion.

TREATMENT. — The treatment consists in the curettement of the granulated tissue, spraying with peroxid of hydrogen, followed by the application of carbolic acid two per cent. in albolene. The general treatment is that of pyemic flushing of the metastatic abscess and general supporting treatment. Should the case survive, tonic doses of iron, quinin and strychnin are cated.

Actinomycosis. — This disease is in the greater number of cases contracted from animals or from the habit of chewing straw to which cattle have had access. One case only has been observed by the author. It is due to infection from the ray fungus. The tumefaction is variable in individuals. The tumor becomes hard and nodular, the contents undergo fatty degeneration, and as a result of mixed infection with pyogenic cocci break down and form a slough.

TREATMENT. — The treatment of this particular disease is very unsatisfactory. Iodid of potassium in large doses is very highly recommended by many. "Opening and curetting the granulated tissue, cauterizing the wound with tincture of iodin is indicated." Sawyer reports flattering results from the injection of from fifteen to thirty minims of one per cent. solution of potassium iodid at an interval of three to four days. Heroic surgical measures for the removal of all affected tissue is often necessary.

Retro-pharyngeal Abscess. — Retro-pharyngeal abscess is characterized by a rapid formation of a circumscribed or diffuse abscess from streptococcus infection well up behind the velum palate or burrowing into the mediastinal or cervical structure. It is more often observed in children.

SYMPTOMS. — The symptoms conspicuous are pain upon swallowing and movement of the head, change in quality of voice, mouth breathing, restlessness, headache, rise of temperature, and rapidity of pulse.

DIAGNOSIS. — The diagnosis is comparatively easy, upon ocular examination. More or less circumscribed swelling may present, with marked redness of the fauces. Sometimes the abscess is located so high up behind the palate as to demand a digital exploration to clear up the diagnosis.

TREATMENT. — The treatment is essentially surgical. Opening the abscess and complete drainage followed by gentle tonic treatment is indicated.

Pharyngomycosis. — A fungoid growth springing from the *follicles of* the pharynx observed very often within the crypts of the tonsils and over the soft palate causing stiffness, constant irritation of the pharynx. They are seen as white horny excrescences tightly agglutinated, and when torn from their attachment leave a bleeding surface.

TREATMENT. — The treatment consists in the curettement of the crypts followed by the application of chromic acid twenty to thirty per cent. or the application of the galvano-cautery.

Pharyngitis Herpetica is presumed to be of a neuropathic origin. The disease is characterized by the formation of small white points over the pharyngeal mucosa, lasting from five to eight days. Slight elevation of temperature, painful deglutition, diffuse redness of the pharynx studded with small herpetic eruptions with the formation of thin membrane resembling that of diphtheria.

TREATMENT. — The treatment consists in spraying the throat with alkaline fluid, gargling the throat as previously directed with :

℞	Potass. chloratis,	1.30 gm. (gr. xx)
	Ac. carbolici,	.12 c.c. (gtt. ij)
	Glycerini,	3.75 c.c. (ʒ j)
	Aquæ destill.,	ad 30.00 c.c. (℥ j)

Teaspoonful to a wine glass of water to be repeated every two hours.

The general treatment consists in the administration of iron in combination with some bitter vegetable tonic. Salicylate or benzoate of soda five grains frequently repeated acts as a good eliminating agent.

Membranous Pharyngitis. — Membranous pharyngitis is an inflammation of the pharynx characterized by the formation of croupous exudation, from streptococcus infection. The general symptoms are those of diphtheria.

TREATMENT. — The treatment consists in the removal of the exudations by means of an alkaline spray followed by spray of one half per cent. hydrogen peroxid or one tenth pe
phoroxol, afterwards carefully applying Löffler's sol

by spray of three per cent. camphol-menthol in albolene. Attention to the general health is of great importance.

Diphtheria. — Diphtheria is an infectious disease due to the Klebs-Löffler bacillus. It is a condition of local coagulating necrosis of the epithelium of the pharynx, which forms an adherent exudation, grayish in color, characterized by a peculiar odor. The onset of the disease is sudden. There may be headache, vomiting and more or less throat symptoms. The temperature is seldom above 103°. The pulse is usually very rapid, due to the absorption of ptomains.

TREATMENT. — The treatment consists in the isolation of the patient, when diphtheria is suspected. Doubtful cases should be subjected to a bacteriological examination.

The local treatment consists in the application of Löffler's solution which is highly recommended by many authorities:

℞	Menthol,	10 parts.
	Toluol,	26 parts.
	Ferri perchloridi sol. fort.,	4 parts.
	Alcohol absoluti,	100 parts.

Signa. To be applied locally once or twice daily.

Ballenger mentions the local application of lactic acid in one fourth to one half strength by means of cotton wound on an applicator to facilitate the exfoliation of the pseudo-membrane from the mucosa. Alkaline antiseptic sprays are frequently indicated for cleansing the nose and throat. Antitoxin treatment is, practically speaking, universally recommended as the best form of therapy. In a general way it may be stated that the dose for a child of two years is 600 to 1,000 units; while 1,500 to 2,000 units should be given to patients over two years of age. A prophylactic dose is 600 to 800 units (Ballenger). W. H. Parks recommends the injection of 1,000 units in mild cases, 2,000 to 4,000 in severe cases seen early, the severity of the disease governing the dose. However those under one year should not *be given* over 3,000 units and those under six months not more than 2,000 units. In severe cases with dyspnea, stricture and evidence of great danger, intubation or tracheotomy must be done without delay.

Internally at the onset of the disease, calomel in one-tenth-grain doses every hour until the bowels are freely moved should be given. When convalescence has begun, the administration of strychnin and iron is indicated. The clothing and room should be disinfected by means of burning sulphur and formaldehyd gas.

The sequelæ of diphtheria are albuminuria, paralysis of accommodation, esophageal paralysis, etc., appearing three to six weeks after the disease has terminated its course. The *treatment* in all such cases is directed to the building up of the debilitated nerves, by rest, strychnin, digitalis, electricity, etc.

Anemia is a non-inflammatory condition accompanying a general disturbance of the nutritive system. Patient complains of a constant irritation of the throat, with a frequent desire to swallow. The underlying cause for this should be sought.

The treatment is rather general than local. Spraying the pharynx with some mild stimulant, as the oil of gaultheria in albolene is indicated. Local treatment is of little value.

Anesthesia is a partial or complete loss of sensation in the pharynx, due to progressive bulbar paralysis or some constitutional dyscrasia.

TREATMENT. — The galvanic current is indicated with large and increasing doses of strychnin internally.

Hyperesthesia is an over-sensitive condition of the pharyngeal mucosa, usually caused by alcoholic liquor, hysteria, elongation of the uvula, or heredity.

TREATMENT. — Large doses of potassium bromid are indicated. Spraying the throat with adrenalin chlorid three times daily will act as a sedative. Any systemic disturbances should be corrected.

Paresthesia. — More especially observed in neurasthen individuals and is a sensation of some foreign body in the th On examination nothing is discernible.

TREATMENT. — The treatment is directed to the building up of the general nervous system by the administration of iron, strychnin and quinin. The static breeze is highly recommended.

Neuralgia. — More often observed in hysterical individuals. It may accompany a uric acid diathesis or may be found in anemic or chlorotic individuals.

The *treatment* is directed to the removal of the individual cause. Mild sedative solution may be prescribed for local or general use.

Neurosis of Motion. — Neurosis may be in the form of spasm or paralysis due to some local irritation or profound systemic disturbance.

The *treatment* is directed to the removal of any irritation followed by therapeutical measures indicated for the restoration of the paralyzed nerve, as strychnin subcutaneously, faradic current and general tonic treatment.

Bursa of the Pharynx. — Such conditions are more often observed in the upper part of the pharynx. In diagnosis the small fistulous opening may be mistaken for an ulcerated spot with prolific secretion. With a malleable blunt-pointed probe, shaped like a goose-neck, with palate far retracted and post-nasal mirror, a diagnosis is easily established.

TREATMENT. — The pockets should be curetted and painted with argentum nitrate sixty grains to the ounce.

The Pharynx in Exanthematous and other Febrile Affections. — Primary and secondary involvement of the throat may be expected in scarlet fever, small-pox, measles, erysipelas, intermittent fever, gout, typhus fever, influenza, varioloid and chicken-pox.

TREATMENT. — A review of the treatment in such cases is hardly necessary, it being directed to the general treatment and the local application of cleansing and antiseptic sprays.

DISEASES OF THE FAUCIAL TONSILS.

Acute Tonsillitis. — The cause of acute tonsillitis is either predisposing or exciting. Among the predisposing causes are exposure to sudden changes of temperature, irregularities in digestion, mechanical irritation and rheumatic diathesis.

The exciting cause is presumed to be microbic. By many the infection is thought to enter through the mucous surface or into the follicles, by others it is presumed that the microörganisms are carried from some adjacent lymphoid tissue to the surface of the tonsil.

Among the many organisms associated with tonsillitis as a cause are streptococcus, staphylococcus, pneumococcus and Eberth's typhoid bacillus.

SYMPTOMS. — The most frequent symptoms of acute tonsillitis is pain in the region of the tonsils, slight elevation of temperature, pain on swallowing, ever-present desire to swallow or expectorate the prolific accumulations of mucus. On ocular examination the tonsils appear more or less swollen, the mucous membrane covering the tonsil and often the entire faucial region is very much inflamed, and covered with a catarrhal exudation. The crypts may be covered with a fibrous exudation, which at times coalesces, resembling the exudation of diphtheria.

TREATMENT. — Free purgation with fractional doses of calomel or magnesium sulphate is at first usually indicated. Ballenger recommends aborting the inflammation by the administration of tincture of aconite in one-minim dose every hour until there is tingling in the fingers or dry prickling sensation in the fauces. Spraying the throat with an equal part of hydrogen peroxid and extract of witch-hazel or camphoroxol in five per cent. solution, afterwards touching crypts with pure guaiacol, is especially efficacious. Pastilles of compound guaiacum can be conveniently borne by the patient. For the elevation of temperature phenacetin in five-grain doses with small doses of three-grain bromid of sodium should be given every three hours. Small pellets of ice dissolved in the mouth will tend to relieve the inflammation. After twenty-four hours hot gargles are especially recommended. When we suspect a rheumatic or gouty diathesis salicylate of soda in combination with salol should be prescribed.

Cryptic Tonsillitis. — Cryptic tonsillitis is an acute inflammation of the crypts of the tonsils from bacterial infection. There may be marked effusion of serum from the follicles or the lumen of the follicles may became occluded and result in necrosis and pus formation. In the severe forms of inflammation the entire faucial region becomes greatly inflamed.

TREATMENT. — Local treatment is virtually the same as that for acute tonsillitis. Crypts should be carefully cleansed of exudations by peroxid of hydrogen, after which the following, which is highly recommended by J. H. Abraham, should be applied to each crypt:

℞	Menthol,	1.80 gm.	(ʒ ss)
	Guaiacol,	5.40 c.c.	(ʒ jss)
	Glycerini,	7.40 c.c.	(ʒ j)
	Alcohol absoluti,	30.00 c.c.	(℥ j)

Rheumatic or Gouty Tonsillitis. — This is an acute or subacute inflammation of the tonsils resembling acute catarrhal tonsillitis, occurring in individuals suffering from a uric acid diathesis, with or without local manifestation of the disease otherwise than in tonsils.

In the great majority of cases of inflammation of the tonsils a uric acid diathesis is present.

DIAGNOSIS. — The diagnosis of rheumatic tonsillitis is based upon symptoms of rheumatism in other portions of the body and inability to cure the disease with local medication.

TREATMENT. — In addition to the local treatment, attention should be directed to the removal of the rheumatic diathesis. This is done by avoiding all foods which tend to produce uric acid, such as meats, coffee, tea, tobacco and alcoholic liquors. The eliminating organs must be stimulated by hot baths and light exercise. Lithia water should be consumed in great quantities, and in addition granulating effervescing phosphates of soda in teaspoonful doses in water, night and morning, should be administered. The local treatment consists in spraying the throat with alkaline antiseptic spray, application of protargol in twenty per cent. solution, gargling with hot milk. Massage externally acts as a sedative and stimulant.

Herpetic Tonsillitis. — Herpetic tonsillitis is characterized by the formation of herpetic vesicles over the surface of the tonsils.

TREATMENT. — Treatment is directed to the building up of the general system. Local application of compound tincture of benzoin and fifty per cent. boro-glycerid (D. Braden Kyle) followed by spraying with two per cent. campho-menthol in albolene twice daily as indicated. For the relief of headache, fever, etc., the following is recommended:

℞	Quininæ bromidi,	.18 gm. (gr. iij)
	Phenacetini,	.18 gm. (gr. iij)
	Creasoti (beechwood),	.18 c.c. (gtt. ij)
	Pepsini puræ,	.06 gm. (gr. j)

Membranous Tonsillitis. — The general pathology of membranous tonsillitis is the same as that in acute follicular tonsillitis. The exudation is more profuse than in acute follicular tonsillitis and undergoes a coagulation-necrosis, with elimination of toxins.

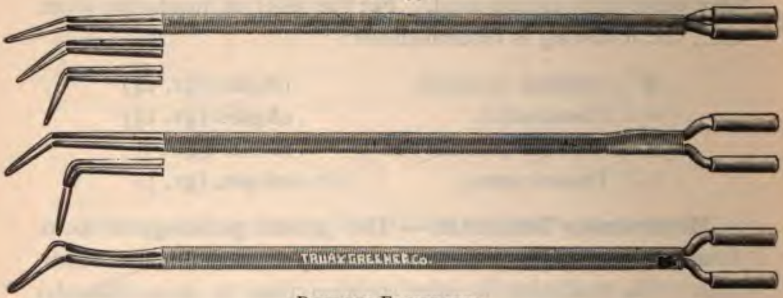
TREATMENT. — The treatment consists in avoiding, as far as possible, general infection from local conditions, by the administration of calomel in one-tenth-grain doses every hour until purgation results, followed by spraying the throat with hydrogen dioxid and local application of Löffler's solution with the internal administration of iron and quinin in tonic doses.

Peritonsillar Abscess. — The local symptoms are characterized by the most excruciating pain in the tonsillar region, confined more especially to one side, difficult breathing and painful deglutition. Successive attacks of acute tonsillitis may cau tonsils to adhere to the pillars of the fauces and by so doing form irregular pockets, which may act as culture tubes for the propagation of pus-producing organisms, which under favorable circumstances migrate into the peritonsillar region and localize, forming an abscess.

TREATMENT. — The general treatment consists in the administration of a free cathartic followed by tonics of iron and stimulants, with liquid diet. If seen in the beginning, the local treatment consists in the frequent application of campho-phenique to the inflamed area with cold ice packs or Leiter coil externally.

The febrile symptoms in an adult may be controlled by giving four drops of tincture of aconite and ten grains of acetanilid every four hours. If after twenty-four hours the pain should continue with acceleration of all symptoms, effort must be made to hasten localization of pus. Moist hot applications externally with inhalations of steam tend to hasten necrosis. Sometimes fluctuation can be discovered by the aid of the finger, which should be gently passed into the mouth, making contra-puncture at the angle of the jaw. As soon as pus is located the parts should be anesthetized by equal parts of carbolic acid, cocain and menthol and incised with a sharp knife, opening being made upward and toward the median line. Subsequent treatment is directed to the building up of the debilitated system.

FIG. 77.



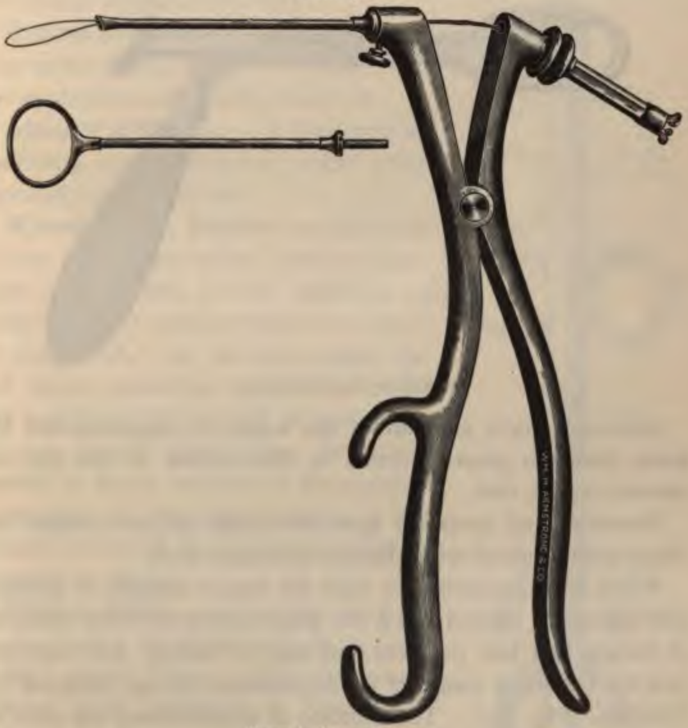
PYNCHON ELECTRODES.

Total extirpation of the tonsils by cautery dissection may be necessary to prevent a second attack.

Hypertrophy of Tonsils. — J. C. Burnell in a work devoted to the cure of enlarged tonsils by medicine recommends baryta, thuja and other antirheumatic remedies.

Reduction of enlarged tonsils by local or constitutional treatment has, as a rule, been very unsatisfactory. Extirpation is the only rational treatment. Fortunately the majority of patients requiring operations are children in whom the danger from hemorrhage is reduced to the minimum.

Fig. 78.



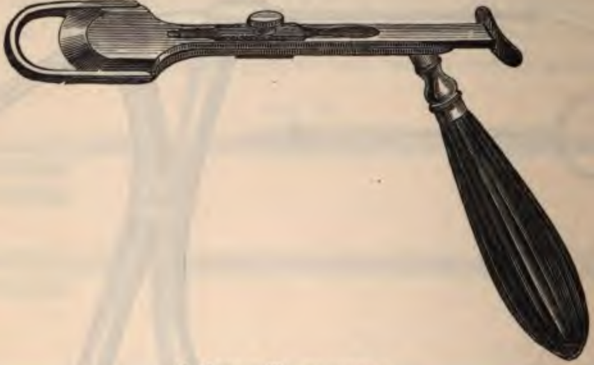
Peter's Cold Snare.

The complete extirpation of tonsils by cautery dissection is highly recommended by Pynchon. Fig. 77 shows the different electrodes used by him.

The cold snare of Peters (Fig. 78) offers many advantages as an instrument of power for this form of operation.

For performing tonsillotomy or tonsillectomy the McKenzie tonsillotome is highly preferred (Fig. 79). The Mathews is recommended by many (Fig. 80).

FIG. 79.



McKENZIE TONSILLOTOME.

Galvano-cautery puncture of the tonsils is recommended by some, though a great objection to this method is that the reduction is very slow.

Preceding any operation upon the tonsils the parts should be thoroughly cleansed with alkaline antiseptic wash.

When local anesthesia is used the tonsils should be sprayed with adrenalin chlorid and a few drops of four per cent. solution of cocain in a two per cent. solution of carbolic acid injected into the tonsils by means of the hypodermic syringe designed by Pynchon (Fig. 81). Tonsillotomy or tonsillectomy can thus be performed with but little pain. In obstinate children narcosis by means of chloroform, ethyl bromid, etc., may be demanded. Under such circumstances it may be necessary to use a mouth gag as illustrated (Fig. 82). Should there be any tendency to hemorrhage, elevation of the head and shoulders, spraying the throat with Dobell's iced solution and dissolving small particles of ice in the mouth or a solution of alum water as a gargle is used. Other methods of controlling hemorrhage is by the administration of ergot. Should it become alarming the Richard's tonsillar hemostat can be applied (Fig. 83).

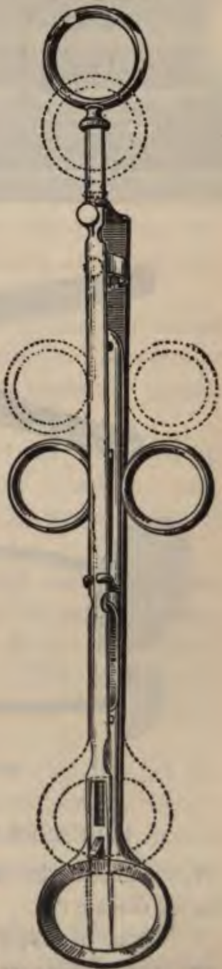
Carious Tonsillitis. — Treatment consists in the free opening of the crypts and the application of campho-phenique.

Atrophy of Tonsils. — A physiological condition, no treatment of value being especially recommended.

Mycosis of the Tonsils is an affection of the tonsils due to the leptothrix buccalis characterized by the formation of adherent white patches within the crypts of the tonsils. In the acute stage the soft fungus growth is easily removed by the application of peroxid of hydrogen. In the chronic stage when the white growth is firmly attached to the surface, application of the actual cautery is indicated, followed by a spray of campho-menthol in albolene.

Foreign Bodies. — They may be very inconspicuous at times, such as an imbedded bristle from a tooth brush, small splinter from toothpick or small particles of fish bone. Careful search must be made in suspected cases for foreign bodies.

FIG. 80.



MATHEWS TONSILLOTOME.

FIG. 81.

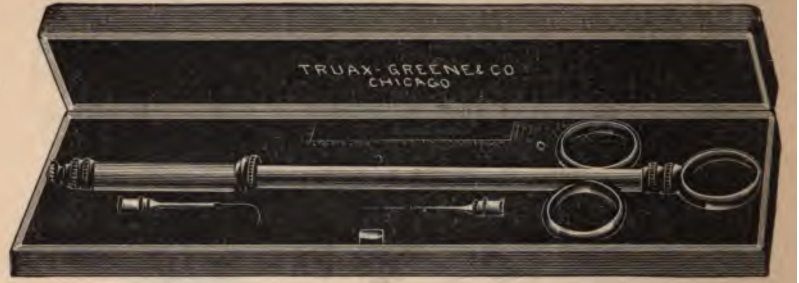


FIG. 82.

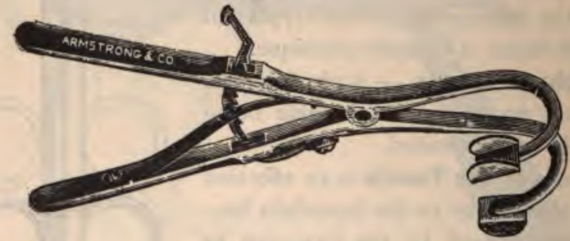
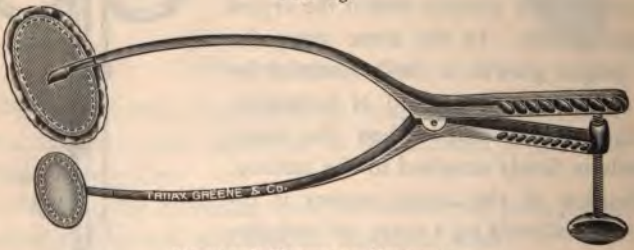


FIG. 83.



RICHARD'S TONSILLAR HEMOSTAT.

DISEASES OF THE LINGUAL TONSILS.

Levy makes the following classification of the symptoms of lingual disease:

1. Those of simple discomfort.
2. Those of severe cough.
3. Those of local distress.

4. Those of respiratory distress.
5. Those of dysphagia.
6. Hemorrhagic cases.

Acute Inflammation of the Lingual Tonsils. — Inflammation of the lingual tonsil is usually from a chemical or traumatic cause.

TREATMENT. — The constitutional treatment must be directed to any dyscrasia. The local treatment consists in astringent gargles, application of nitrate of silver, twenty grains to the ounce, followed by spray of two per cent. campho-menthol with hot antiseptic gargle for home use.

Acute Phlegmonous Tonsillitis. — Acute phlegmonous tonsillitis is characterized by the formation of abscess from infection, brought about by some traumatic or chemical injury.

TREATMENT. — As soon as the abscess can be located it should be incised. Pain may be controlled by orthoform lozenges or hypodermatic injection of morphia. Hot antiseptic gargles should be frequently used.

Hyperplasia of the Lingual Tonsils. — Hyperplasia is not an infrequent condition of the lingual tonsil and is due to a prolonged irritation from excessive use of tobacco, alcoholic liquors or uric acid diathesis.

TREATMENT. — One case of obstinate cough under treatment reacted to the application of chromic acid in ten per cent. solution applied along the inflamed gland. In the majority of cases the galvanic cautery is recommended. The parts should be anesthetized by equal parts of cocain, menthol and carbolic acid, before application of the cautery.

Lingual Varix. — A varicose condition of the veins at the base of the tongue, frequently observed accompanying hyperplasia of the lingual tonsils. Their importance as an irritant is often over-estimated. Hemorrhage may be observed following this condition.

TREATMENT. — Under an anesthetic of carbolic acid, menthol and cocain, the varix can be destroyed by the galvanic cautery.

DISEASES OF THE LARYNX.

Before entering upon a discussion of each individual condition a few practical points seem worthy of mention.

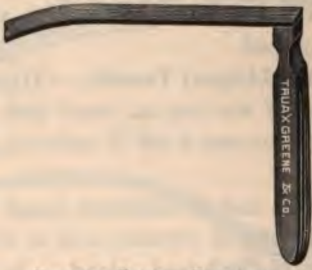
Examination of the larynx is, to the beginner, very difficult. Many general practitioners soon give up all efforts to perfect themselves in the technique on account of meeting disappointment in the first few cases presented.

Grünwald, in his beautiful atlas and abstract of the "Diseases of the Larynx," makes some practical hints, which I take the liberty of appropriating.

"Examinations should be made before meals, if possible, to prevent vomiting.

"The tongue should be actively protruded and in this position should be held firmly by the operator, first grasping with small napkin. Sometimes the back of the tongue bulges upward and it must be depressed by tongue depressor of Kirstein. All efforts at examination should be without force, but yet with firmness. The mirror is held gently but firmly against the uvula, not over nor to one side. The larger the mirror, the more satisfactory the image reflected. If the patient chokes before the mirror is in place make him say 'A' as in 'fate,' very loud and long. Have the patient take long deep breaths with mouth in proper position before trying to introduce the mirror. Never, not even

FIG. 84.



KIRSTEIN TONGUE DEPRESSOR.

for practice, make the patient say 'Ah,' but always 'A,' as the epiglottis is only raised in high pitched notes."

This suggestion will, in many cases of bulging upward of the back of the tongue bring the larynx into view without the aid of the tongue depressor. "The reflector should always be held in front of the eye, using both eyes." Rest is a great factor in the cure of inflammation of this region. Smoking and drinking are great irritants, and in acute and subacute conditions should be prohibited.

Malformations of the Larynx. — A condition congenital or acquired. Congenital may be treated if due to a web between the vocal cords, by the Whistler cutting dilator. If due to true hypertrophy, destruction by cautery or punch forceps is necessary.

Acquired stenosis may be due to syphilis, injury, tuberculosis, malignant or benign growths. The constitutional treatment in each case is directed to the removal of the cause. The local treatment consists in using the Whistler cutting dilator, inserting O'Dwyer tube, or actual cautery, as the condition of the case may demand.

Laryngitis in Constitutional Diseases. — In many diseases laryngitis of a mild type is one of the accompanying conditions. It may complicate with scarlet fever, typhoid fever, measles, malarial fever and malarial infection. The thorough conception of the therapy of acute and chronic catarrhal conditions will suggest the treatment in each case.

Acute Catarrhal Laryngitis. — This is an acute inflammation of the mucous membrane of the larynx brought about by climatic conditions, poor ventilation, improper use of the voice, intestinal disturbances, and inhalations of irritating gases. The symptoms vary according to the degree of inflammation. Hoarseness with complete loss of voice, dry hacking cough are conspicuous symptoms of the disease. On examination with the laryngeal mirror, the cords will appear more or less inflamed and thickened according to the degree of inflammation. After twenty-f [illegible] a thick glassy mucus covers the vocal bands. The ends in complete recovery in three to four days. If the treatment is neglected many weeks may elapse until the cords are completely restored to the normal.

General Treatment.—If due to irritating gases, poor ventilation, etc., an immediate change of environment is necessary. In the beginning calomel in one-tenth-grain doses should be given every hour until free purgation results. All use of the voice should be prohibited for forty-eight hours. The room should be kept at a temperature of 65° F. A wet compress over the larynx held in position by a flannel bandage, otherwise known as the Pressnitz bandage, should be worn. Talking, smoking and alcoholic liquors should be prohibited. Spraying the throat frequently with adrenalin chlorid 1/10,000 followed by some bland medicated oil, is especially efficacious. Internally we may administer elixir terpin hydrate with heroin one drachm every three hours, or:

℞	Ext. belladonnæ,	.008 gm. (gr. $\frac{1}{8}$)
	Codeinæ sulph.,	.03 gm. (gr. ss)
	Camphoræ,	.03 gm. (gr. ss)
	Quininæ bromidi,	.06 gm. (gr. j)

In capsule, No. 1.
Signa. One every three hours.

They will control the distressing cough and relieve congestion. After a week, mild astringents are well borne. "After ten to fifteen days, the larynx may be painted with two to four per cent. argentum nitrate," followed by campho-menthol spray.

Traumatic Laryngitis.—As the name implies this is an acute pharyngitis due to a traumatic or chemical injury.

Treatment.—The treatment consists in the application of the Leiter coil, ice bags or the Pressnitz bandage to the throat, liquid diet and rest. If edema results scarification may be necessary.

Membranous Laryngitis, otherwise known as membranous croup. Croup is more often observed in children, especially those exposed to unhygienic surroundings, or sudden climatic change.

The membranes become suddenly hyperemic and swollen with a proliferation of a catarrhal exudation which rapidly coagulates, forming a pseudo-membrane. Klebs-Löffler bacillus may be found in the pseudo-membrane, but as a rule it is absent.

Conspicuous symptoms are those of sudden chill with rise of temperature, progressive restlessness, with painful deglutition, peculiar croupy cough. The amount of dyspnea and cyanosis is in proportion to the false membrane which may or may not be expelled by coughing. The false membrane usually begins to form about twenty-four hours after the first symptoms. The membrane may reform after being expelled. The disease runs its course in from three to six days, terminating very often fatally.

Treatment. — Since the absence of the Kelbs-Löffler bacillus does not positively differentiate the disease from diphtheria, the treatment is virtually the same as for diphtheria. In the beginning cold applications externally with free purgation by small doses of calomel is indicated. The room should be kept at an even temperature.

Hemorrhagic Laryngitis. — Characterized by areas of hemorrhagic infarction. If small areas they may undergo absorption. If a hematoma form, incision is demanded. To allay pain heroin in one-twelfth-grain doses should be administered every three or four hours. The throat should be sprayed with adrenalin chlorid followed by three per cent. solution of campho-menthol in albolene. Rest to the voice is indicated while exercise should be judiciously indulged in.

Follicular Laryngitis. — The minute follicles of the mucosa of the larynx become swollen and congested, which gives rise to a dry irritating cough. It is often associated with a like condition of the pharynx.

The *treatment* consists in those remedies which stimulate glandular secretions, as phosphorus in 1/100 grain doses, iodopin in ten per cent. solution one teaspoonful three times daily. applications externally followed by drying the skin by with coarse towels will act as a stimulant. Treatment condition of the pharynx or any underlying cause is of prime importance. Recovery is often very slow.

Hyperplastic Laryngitis is a condition of increase of cellular structure due to prolonged irritation. When once established there is little in the way of local or constitutional treatment that will be of especial value.

Acute Edema of the Larynx. — This is due more especially to the accumulation of fluid in the wide lymph spaces of the vocal cords. Uncomplicated it is an uncommon affection. Scarification with concealed laryngeal lancet and application of glycerite of tannin, spraying with solution of suprarenal gland or adrenalin chlorid is recommended. Pilocarpin in one-twentieth-grain doses to stimulate elimination with strychnin as a heart tonic should be administered.

Laryngitis Stridulus. — A spasm of the glottis accompanied by stridor seen in children. While the spasm is on, treatment consists in an attempt to excite respiratory effort. For this cold water splashed in the face, patting patient on the back or the forcible extension of the tongue all aid in exciting the inspiratory movements. The following is highly beneficial:

℞	Tinct. belladonnæ,	.74	(gtt. xij)
	Chloralis hydratis,	1.25	(gtt. xx)
	Potass. bromidi,	3.9	(ʒ j)
	Syr. pruni vir.,	15.00	(℥ ss)
	Aq. men. pip.,	90.00	(℥ iij)

Signa. Teaspoonful every hour until relief from the spasm is produced.

Examination for any morbid condition in the naso-pharynx or pharynx as adenoids, enlarged tonsils, etc., should soon follow. Any constitutional dyscrasia should as far as possible be removed.

Laryngitis Sicca. — A condition of atrophy of the mucous membrane with the lodgment of crusts upon the surface. It is usually secondary to a similar condition of the naso-pharynx. The treatment is the same as that indicated for pharyngitis sicca.

Those remedies which tend to the promotion of glandular secretion should be administered such as phosphorus one one-hundredth-grain doses, iodid of potassium or iodopin ten per cent. solution. Spraying the throat with Dobell's solution or inhaling steam from boiling water to which has been added one to three grains of carbolic acid (D. Braden Kyle) will aid in the removal of the secretions. Frequently spraying the throat with:

℞	Menthol,	.30 (gr. v)
	Ol. pini,	.24 (gr. iv)
	Albolene,	30.00 (℥ j)

will relieve the more distressing symptoms. Chlorid of zinc in one per cent. solution applied direct will have a stimulating influence.

Anemia of the Larynx usually accompanies a like condition of the pharynx. When observed independently it is pathognomonic of tuberculosis.

TREATMENT. — The treatment is directed to the constitutional diathesis which alone is the cause.

Hyperemia of the Larynx may be seen in plethoric individuals, or in those who use tobacco or alcoholic liquors to excess. Treatment is directed to the removal of the cause producing the local hyperemia.

Pemphigus of the Larynx. — Eruption of vesicles not unlike that of herpes, found upon the vocal bands or arytenoid surfaces. Treatment consists in cleansing with Dobell's solution, antiseptic gargles and the correction of any intestinal derangement.

Syphilis of the Larynx[1] may be inherited or acquired, being a local manifestation of a systemic infection. The treatment is virtually the same as that for a like condition of the nose and throat and the student is referred to treatment of those organs.

Tuberculosis of the Larynx may be a primary infection but is more often a secondary, due to the tubercle bacilli [illegible] way getting into the subepithelial layer (Karkinoff).

---

[1] See Syphilis of the Nose.

"The Schuppel-Langerhans tubercle may be of irregular, diffuse or round cell infiltration. More often seen on the posterior wall."

It is very essential that tuberculosis of the larynx be recognized early. Monsarrat finds that in some patients before tuberculosis is recognizable there is a beginning laryngitis. The chest signs are very slight yet the cough is persistent, violent and paroxysmal. The larynx should be carefully watched. A dry cough coming by fits and starts when the patient begins to speak is a suspicious symptom.

Monsarrat mentions the lump in the throat with no visible signs as suggestive of the beginning of tuberculosis. The treatment is both local and constitutional. The local treatment depends upon the stage of the disease.

The catarrhal stage is divided by Freudenthal into anemia, hyperemia and swelling. The treatment in each condition is decidedly different. In the anemic stage the treatment consists in spraying the larynx with an alkaline solution and subsequently dusting with zinc sozoiodol with sugar of milk, application of nitrate of silver in three per cent. solution, liquor ferri sesquichlorid (1.0 : 30) and Peruvian balsam with spirits vini rectif. (Freudenthal).

In the hyperemic stage Freudenthal uses creasote 0.5, spirits vini 10.0, glycerin 50.0. Inhalation by nebulization of:

℞	Menthol,	.60 gm. (gr. ix)
	Chloreton,	.60 gm. (gr. ix)
	Creasoti,	.60 c.c. (gtt. x)
	Albolene,	30.00 c.c. (℥ j)

or inhalations by steam of the following:

℞	Menthol,	.18 gm. (gr. iij)
	Creasoti,	.6 c.c. (♏ x)
	Tr. benzoinatis comp.,	60.00 c.c. (℥ ij)

When erosion or ulceration occurs the remedy in greatest vogue to-day is the application of lactic acid as recommended by Dr. use.

Freudenthal in a recent article in reference to lactic acid, says: "It should be dispensed with as an antiquated and barbarous torture to the patient." He further recommends the following systematic treatment, as if not curative, at least so markedly palliative that the horrible suffering from the disease and treatment is reduced to the minimum.

1. The dusting of suprarenal gland three to six grains into the throat for the preliminary anesthesia.

2. The application of the following emulsion which produces large general anesthetic and is a curative agent.

℞	Menthol,		.90 gm.	(gr. xv)
	Ol. amygdal. dulc.,		15.00 c.c.	(℥ss)
	Vitelli ovarim,		25.00 c.c.	(ʒvij)
	Orthoform,		12.5 gm.	(ʒiij)
	Aquæ destill.,	q. s. ad	100.0 c.c.	(℥iij)

Fiat. Emulsionis.

3. Olive, sesame or almond oil for the relief of the dysphagia in glass doses.

4. Phototherapy or treatment by means of the electric light or sunlight.

5. Heroin for the relief of the bronchial cough.

The general treatment consists in the administration of cod-liver oil, rest, plenty of sunlight, freedom from dust and change of climate.

Lupus of the Larynx is a tuberculous infection of the superficial layer of the mucous membrane. Small nodular masses covering any portion of the larynx progress and without inflammatory change are symptoms of the disease. Ballenger recommends 120 to 480 grains nitrate of silver to the ounce applied locally. There is a tendency to spontaneous cure. Treatment should be directed to the general building up of the system.

Benign Tumors. — Those situated in the larynx are papilloma, cystoma, myxomatoma, fibratoma, adenomatoma, lipomatoma, angiomatoma, and enchondromatoma. The treatment is essentially surgical. The use of tobacco, alcoholic liquors or any irritating substance is interdicted.

Malignant Tumors. — The cause of morbid conditions known as cancer is yet imperfectly understood. Gaylord mentions that after investigation, he was convinced that an organism known as protozoön is the cause of cancer. Malignant tumors of the larynx are carcinoma and sarcoma. The treatment is surgical, being the total extirpation of the larynx. Local treatment is directed to the mitigation of the distressing symptoms.

Cleansing with dioxygen diluted one half with water with dusting with orthoform or stearate of zinc and cocain. Pastilles of menthol and cocain dissolved in the mouth will relieve many distressing symptoms.

Acute Epiglottitis. — Usually associated with inflammation of the surrounding tissues (Ballenger). Treatment is the same as in laryngitis. The application of argentum nitrate four grains to the ounce or chlorid of zinc two grains to the ounce will stimulate resolution.

Chondritis and Perichondritis is a rare disease usually due to syphilis, tuberculosis, specific fever, diphtheria, trauma or exposure to cold. Painful deglutition, pain on pressure, hyperemia of the larynx, swelling of the cartilaginous framework with the rise of temperature are among the symptoms observed. Treatment depends essentially upon the etiology. If to cold, trauma or fever, cold applications by means of the Leiter coil or Pressnitz bandage should be instituted. Calomel should be given in one-fourth-grain doses, followed by a saline until catharsis is produced. If due to syphilis, tuberculosis, typhoid fever, or rheumatism immediate constitutional treatment must be instituted. In tuberculosis the treatment consists in change of climate, internal administration of carbonate of guaiacol in three-grain doses. During cold weather cod-liver oil should be given. In syphilitic conditions the iodid of potassium is pushed to the point of tolerance followed by mercury and tonics of iron, quinin, etc.

In typhoid fever scarification may be necessary, followed by a spray of five per cent. campho-menthol in albolene. If suffocation is imminent tracheotomy is demanded.

Rheumatic conditions demand the anti-rheumatic treatment as in like conditions of the pharynx with massage and hot applications externally.

Singers' Nodules is a condition of hyperplasia of the epithelium and superficial fibrous layers of the vocal cords (Chiari) involving one or both of the cords, found more especially among singers. The treatment is very unsatisfactory. The galvanic cautery may be used for the destruction of the nodules, and should they be pedunculated they may be removed by means of the Mackenzie cutting forceps. Rest of the cords is essential. The local application of astringents is seldom of value.

Laryngeal Hemorrhage is an extravasation of blood into the submucosa of the larynx due to some constitutional disturbance, sudden straining of the larynx by loud speaking or crying or trauma.

The *treatment* consists in dusting into the larynx powdered extract of suprarenal gland. If a hematoma should form it must be incised. The after treatment consists in spraying the throat with five per cent. campho-menthol in albolene.

Prolapse of the Laryngeal Ventricles. — An inversion of the mucous lining of the ventricle may result from paroxysms of coughing.

Local treatment other than the correction of the constitutional dyscrasia predisposing to such condition, such as syphilis and tuberculosis, is of little value. Surgical measures may be indicated for the ablation of the prolapse.

Total Unilateral Paralysis of the Recurrent. — With the exception of the crico-thyroid all the muscles receive motor impulses from the recurrent laryngeal. In paralysis of the right or left nerve all motion is lost.

The *treatment* depends upon the cause. If from diphtheria, strychnin, iodid of potassium, iron, faradic or galvanic electricity is indicated. If due to aneurysm or tumor an operation only will give relief.

Total Bilateral Paralysis of the Recurrent. — The treatment is the same as for unilateral paralysis. When due to aneurysm of the aorta treatment is of no value.

Unilateral Paralysis of the Abductors. — The right or left vocal cord approximates the median line.

TREATMENT. — If due to some local condition it should be corrected by astringent sprays. If due to syphilis, iodid of potassium is indicated. Asphyxiation is one of the possibilities and intubation may be necessary at any time.

Bilateral Abductor Paralysis. — The two cords are continuously approximated, which makes respiration and speech both difficult. When the disease is slow in its progress prognosis is usually bad.

Treatment is the same as in unilateral paralysis.

Paralysis of the Individual Muscles. — Diagnosis is established by laryngoscopic examination. The cause of such paralysis is usually overuse of the voice, syphilis, rheumatism and typhoid fever. The muscles involved are the arytenoid, thyro-arytenoid and the lateral crico-arytenoid.

TREATMENT. — If the paralysis is dependent upon some systemic disease the prognosis is usually good. The treatment is directed to the removal of the cause. Rest of the voice, light exercises, strychnin internally and galvanism are indicated.

Nervous Cough. — May be due to impacted cerumen, adenoids, irritation within the nasal mucosa, or vaso-motor disturbance.

The treatment should be directed for a search of any condition which might reflexly produce such a cough. Iron, quinin and arsenic should be given internally. Change of climate may bring relief.

Anesthesia. — Loss of sensation within the larynx may be partial or complete, due to cerebral tumor, syphilis, hysteria, *locomotor* ataxia and paralysis.

TREATMENT.—Strychnin one fifteenth grain hypodermatically, iron and phosphates internally, rest, massage, and galvanic current in the strength of 5 ma. is indicated. The positive electrode is applied to the mucosa and the negative to some portion of the body. If the lesion is central local treatment is of no value.

Hyperesthesia is an over-sensitive condition of the larynx which predisposes the patient to coughing and irritation of the larynx when exposed to cold, smoke, dust, etc.

TREATMENT. — The treatment is directed to the correction of any morbid condition of the larynx, or adjacent tissue, as ulcer, fissures, etc. Spraying the throat frequently with menthol five grains to the ounce of albolene or solution of adrenalin chlorid will reduce the hyperesthesia temporarily and eventually act as a curative agent.

Paresthesia. — A morbid or perverted condition within the larynx sometimes observed in hysterical or highly nervous individuals. Very careful and repeated examinations should be made to discover possible cause, local or reflex.

TREATMENT. — The treatment is directed to the building up of the general system. Spraying the throat with solution of adrenalin chlorid or menthol ten grains to the ounce of albolene and light outdoor exercise is indicated.

Mogiphonia. — A condition of relaxation of the vocal cords, which may follow violent exercises of the voice, resulting in partial or temporary loss of the voice. Treatment consists in rest or massage with the correction of any post-nasal or alimentary disturbances.

Neuralgia. — Neuralgia may be recurrent or paroxysmal, and is usually associated with malaria or rheumatism.

TREATMENT. — Any of the coal-tar preparations may be given or:

℞	Butyl-chloral-hydratis,	.30 gm. (gr. v)
	Zinci phosphidi,	.005 gm. (gr. $\frac{1}{12}$)

To be given four times daily. Gouty and rheumatic complications should be corrected. Spraying the throat with five per cent. campho-menthol produces an anesthetic effect.

Hysterical Aphonia. — Usually due to a functional disturbance of the sensory centers observed more especially in hysterical females. The disease is sudden in its onset with no symptoms of local inflammation. Sometimes great shock may be followed by complete loss of the voice. Prognosis is usually favorable.

TREATMENT. — The treatment is directed to building up the system by strychnin in large doses combined with elixir glycerophosphates of soda and lime. Mental suggestion may be of value.

Chorea of the Larynx. — In a chronic incoördination of the laryngeal muscles, due to syphilis, tuberculosis, chronic alcoholism, structural change in the larynx or general choreic movements.

TREATMENT. — Galvanic and faradic electricity, sedative inhalations, and spraying the throat with adrenalin chlorid for its anesthetic effect is indicated. Arsenic and iron internally should be administered. Sodium cacodylate is doses of .02 to .04 gm. hypodermatically is highly recommended by Lanois in the treatment of chorea.

Dysphonea Spatica is a spasm of the glottis resulting from approximation of the cords, due to some local or general disturbance of the nervous system.

TREATMENT. — The treatment promises but little. Elixir glycero-phosphate of soda and lime internally with inhalations of:

℞	Menthol,	1.00 gm. (gr. xv)
	Tr. hyoscyami,	8.00 gm. (ʒij)
	Tr. benzoinatis,	30.00 gm. (℥j)

One teaspoonful to a glass of water may be used advantageously.

Laryngeal Vertigo is a very rare affection, characterized by a spasm of the adductor muscles, lasting for a short time, occurring after long intervals accompanied by vertigo, cyanosis and often unconsciousness.

TREATMENT. — Internal administration of bromides in large doses, is highly recommended with the correction of any local diseased condition.

Stammering is a functional trouble in which the patient convulsively repeats words and syllables.

Makuen has contributed a great deal of valuable information relative to the treatment of such cases, recommending gymnastic methods which tend to develop the respiratory and vocal organs.

Stuttering. — As in stammering the treatment is essentially directed to gymnastic exercises of the breathing apparatus.

Special attention is given to the diaphragm, followed by that of the voice and speech, pronouncing vowels and diphthongs, slowly then gradually increasing in intensity and rapidity (Coen).

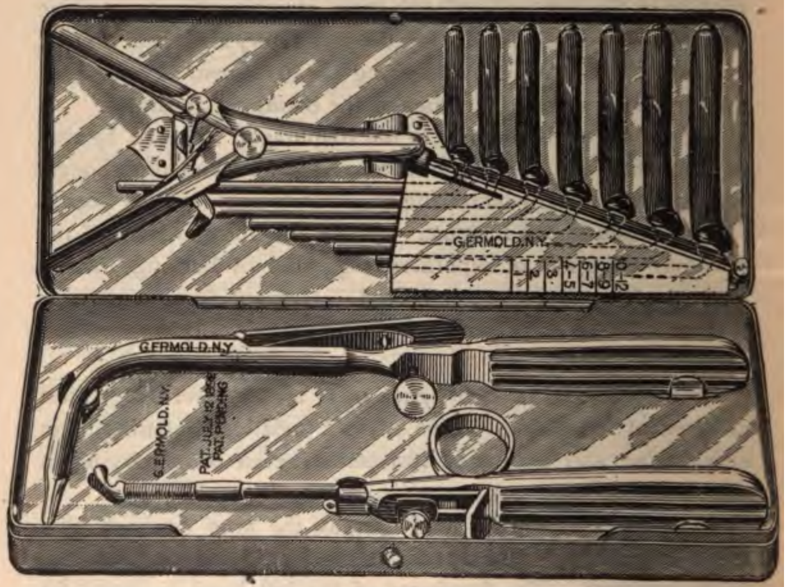
Intubation of the Larynx. — Since the introduction of the antitoxin treatment of diphtheria suggested by Behring, intubation is not so frequently practiced. Dyspnea from diphtheria and causes heretofore enumerated now occasionally demand this procedure.

Instruments and tubes designed by O'Dwyer meet the greatest number of indications. The set, in a metal case, consists in an introducing and extracting instrument, seven tubes varying in size, a metal finger stall and a strong mouth gag.

The patient should be held upright, the arms confined by a sheet over the body, the mouth gag is inserted and head steadied by an assistant. The forefinger of the left hand is passed far back into the glottis, until the tip of the epiglottis can be felt. The tube is then inserted in the median line, the handle of the introducer depressed to the chest of the child. Upon the tube reaching the finger which acts as a guide, the handle is elevated and drawn forward, the finger now guiding the tube into the larynx. Previous to inserting the tube a strong silk thread should be passed through the shoulder of the tube; this is looped over the little finger of the left hand to prevent the tube slipping into the esophagus. The thread can be looped over the ear of the patient for a few hours or withdrawn immediate tube is known to be in position. In removing the thread the index finger is introduced and held against the shoulder to prevent the tube slipping out of position.

The removal of the tube is often far more difficult than its insertion. For this the extracting instrument is used. The index finger of the left hand is again passed to the tip of the epiglottis and acts as a guide for the extractor. As soon as the closed blades enter the tube they are separated and firmly held in position and the tube is carefully withdrawn.

FIG. 85.



O'DWYER'S INTUBATION SET.

Foreign Bodies in the Larynx. — During the act of eating, laughing, etc., foreign bodies of varied character may be drawn into the larynx. With the aid of the finger the body may sometimes be dislodged. During expiratory effort, slapping patients on the back often aids in expelling the foreign bodies.

In emergency cases the throat should be sprayed with adrenalin chlorid followed by spray of fifteen per cent. cocain, then with the McKenzie lateral throat forceps the foreign body may often be extracted. Kirstein's autoscope may be used to advantage. If strangulation is imminent tracheotomy may be necessary. The fluoroscope may be of advantage in the diagnosis of the presence of foreign bodies in the larynx.

Fracture of the Larynx. — Fracture of the hyoid bone is an infrequent condition. The thyroid and cricoid cartilages are more often fractured by blows, choking by hand or rope, by blunt instrument or gunshot.

SYMPTOMS. — The conspicuous symptoms are great pain and swelling of the larynx, crepitation, dyspnea, convulsive coughing and blood expectoration and difficult swallowing. Speech is rendered very difficult or is entirely lost. Marked emphysema may follow rupture of the mucous membrane.

TREATMENT. — The treatment is directed to the correction of the displacement by passing the finger into the pharynx and making contra-pressure. The subsequent treatment is directed to the reduction of the swelling by hot moist applications, rest in bed, etc. In increasing dyspnea tracheotomy is indicated. Hemorrhage from the mucous surface may be controlled by touching the bleeding surface with sponges which have been moistened in a hot solution of adrenalin chlorid 1/5,000.

Dislocation. — This condition may cause instantaneous death. Stenosis may result from subsequent inflammation. Permanent stenosis of the larynx usually follows dislocation.

TREATMENT. — The treatment is directed to the reduction of the inflammation by moist hot applications, followed by rest and liquid diet.

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